The Pavilion Gates

The UWM Power Plant Cistern Project

[redacted] *AIA, LEED-AP*

DRAFT 9.28.2013

Acknowledgements

University of Wisconsin – Milwaukee received financial support for this project in the amount of $ 85,733 from the U.S. EPA through the Great Lakes Restoration Initiative. This project has also been supported by the Milwaukee Metropolitan Sewerage District and the 'UWM as a Zero-Discharge Zone' Demonstration Project Fund.

Principle Investigator and Lead Designer

[redacted] AIA, LEED-AP
Associate Professor and Chair, Dept. of Architecture, UWM

Project Team

Civil and Structural Engineering
[redacted] Joehnk Engineering
in association with Gestra Engineering

Project Manager, Division of Facilities Development
[redacted]

DFD Construction Representative
[redacted]

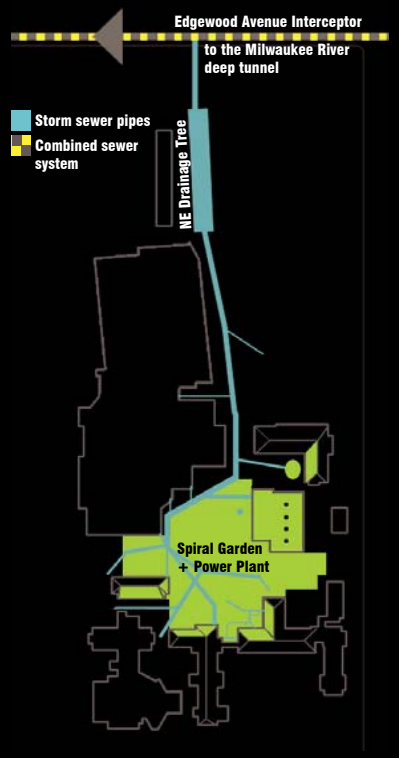
UWM Campus Architect
[redacted]

General Contractors
Gruneau Construction

Core Student Team, 2010- 2013

[redacted]

CONCRETE TREES need GREEN LEAVES

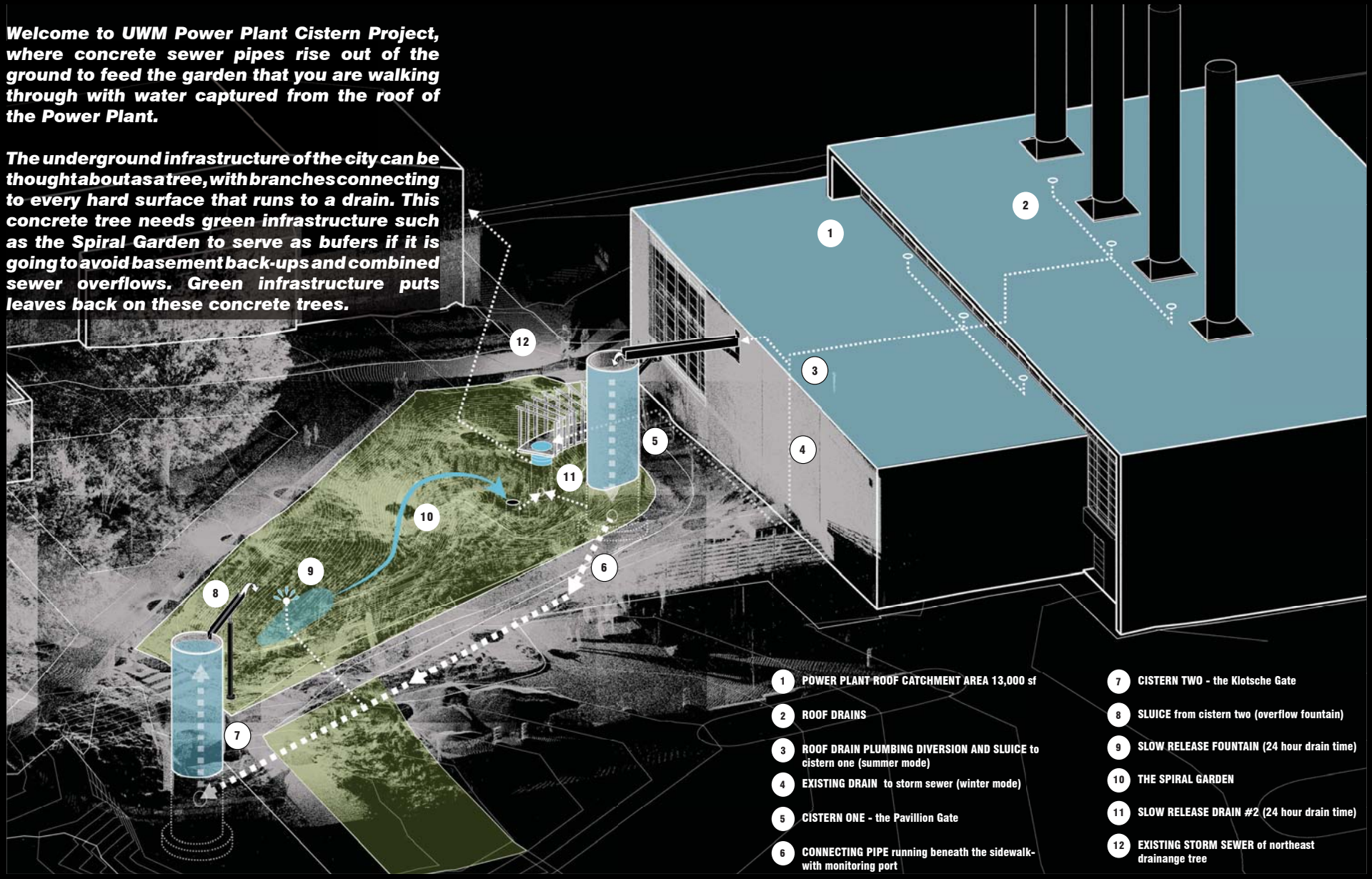


Power Plant Cisterns

power plant catchment area: 13,000 sf
cistern capacity: ___ gallons
inches of rainfall: 1.5
gallons of water: ___ gallons

Welcome to UWM Power Plant Cistern Project, where concrete sewer pipes rise out of the ground to feed the garden that you are walking through with water captured from the roof of the Power Plant.

The underground infrastructure of the city can be thought about as a tree, with branches connecting to every hard surface that runs to a drain. This concrete tree needs green infrastructure such as the Spiral Garden to serve as bufers if it is going to avoid basement back-ups and combined sewer overflows. Green infrastructure puts leaves back on these concrete trees.



1. POWER PLANT ROOF CATCHMENT AREA 13,000 sf
2. ROOF DRAINS
3. ROOF DRAIN PLUMBING DIVERSION AND SLUICE to cistern one (summer mode)
4. EXISTING DRAIN to storm sewer (winter mode)
5. CISTERN ONE - the Pavillion Gate
6. CONNECTING PIPE running beneath the sidewalk- with monitoring port
7. CISTERN TWO - the Klotsche Gate
8. SLUICE from cistern two (overflow fountain)
9. SLOW RELEASE FOUNTAIN (24 hour drain time)
10. THE SPIRAL GARDEN
11. SLOW RELEASE DRAIN #2 (24 hour drain time)
12. EXISTING STORM SEWER of northeast drainange tree

The UWM Power Plant Cistern Project Explained in Three Metaphorical Sub-Titles:

Concrete Trees Need Green Leaves

The Cisterns are the latest addition to the Pavilion Gateway Project, a proposal to transform a back entry into the UWM Campus into a ecological stormwater infrastructure interpretive path. This project is predicated on recognizing one branch of the campus's stormwater pipe network as a branch of a much larger tree and systematically adding leaves of green infrastructure to every surface plumbed to that branch.

The Pavilion and Klotche Gates

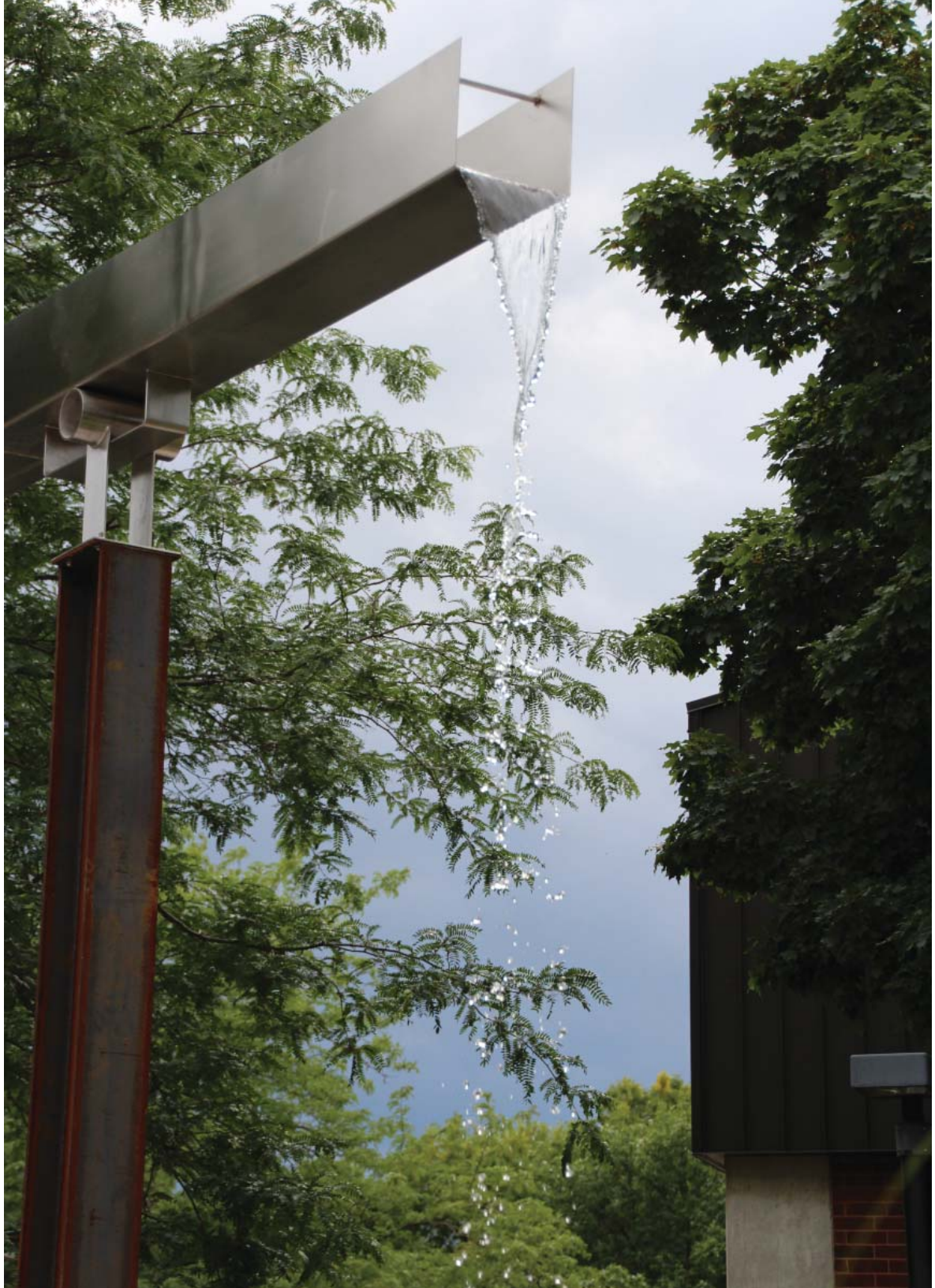
The linked pair of cisterns that capture the Power Plant's roof and drain it slowly to the Spiral Garden form the northern portals of the interpretive path near the bottom of the drainage. Similar portal structures are proposed for Hartford Avenue at the top of the drainage.

The Knight and the Rook

How else to explain the strange characters of these sewer pipe towers, both of which have been displaced from their designed home by unforeseen underground obstacles? They are pieces on a chess board.

The Rook, sitting at the corner of the board but facing straight ahead. The knight, blocking our path but moving laterally with its elongated snout. Their presence is meant to make one aware of moving through a landscape checkered with soft and hard surfaces.

'Over the wetlands and through the woods,
it's off to class we go.'



That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics. That land yields a cultural harvest is a fact long known, but latterly often forgotten

-Aldo Leopold
A Sand County Almanac. xix

BACKGROUND

The UWM as a Zero-Discharge Zone: A Stormwater Masterplan for the University of Wisconsin-Milwaukee Campus

Winner- 2013 Society of College and University Planners 'Excellence in Planning Award for a Campus Component.'

(Text from the Award Submission)

Project Details

- Campus Component
- University of Wisconsin-Milwaukee, Milwaukee, WI
- Public University
- Masterplan completed in 2006. Implementation ongoing.
- Masterplan grant $60,000. Investment to date in implementation approx. $3M. over four projects (approx. $1.8M raised from outside sources by P.I.)
- Site Area- 91 Acre urban campus

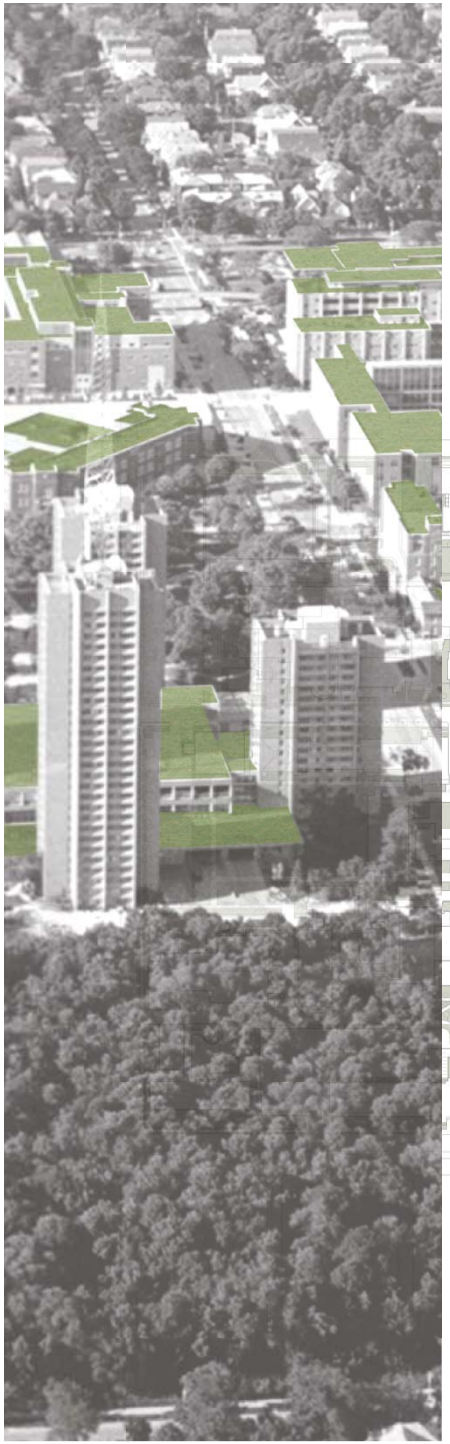
Project Scope

"Cooperative, compatible, sustainable development is an essential goal of campus planning, and the university has a responsibility to provide leadership to achieve this goal."

-University of Wisconsin System
Campus Physical Planning Principles. September 2001

The UWM as a Zero-Discharge Zone (ZDZ) plan was undertaken initially as a funded academic research project intending to prove the technical feasibility of transforming our 91 acre urban campus into an ecological waterscape meeting the same stormwater discharge rate for a 100 year storm event as it would have in its pre-(European) settlement state.

The underlying purpose of the study has been to lay the groundwork for an ongoing campaign of demonstration projects intended to both reduce flooding adjacent to the campus and to reduce the campus's contribution to combined sewer system overflows into Lake Michigan. Located on a compact University campus, these demonstration projects have also offered unique opportunities for research and public education....



FINAL REPORT May 5, 2006

UWM as a Zero-Discharge Zone:

A stormwater masterplan for the UWM Campus

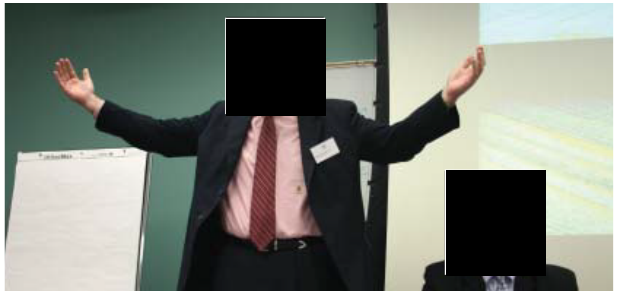
An interdisciplinary faculty/ student research project funded by the Milwaukee Metropolitan Sewerage District. Additional funding provided by UWM Community Design Solutions.

Associate Professor [redacted]
Principle Investigator

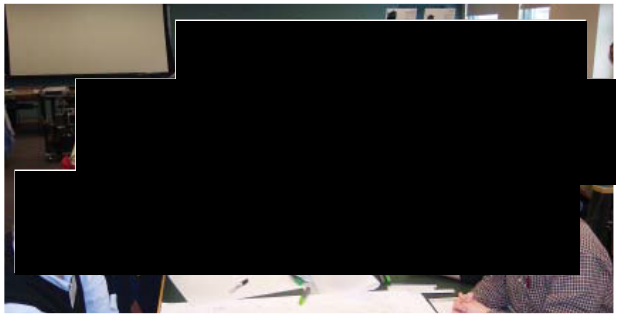
MMSD
Preserving The Environment • Improving Water Quality

the UWMILWAUKEE idea
Community Design Solutions

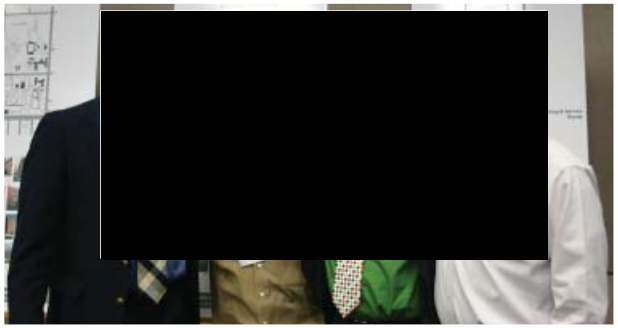
Milwaukee Mayor [redacted] and Metropolitan Sewerage District Director [redacted] opening the 'Waterscapes' Design Charrette, April 28, 2005.



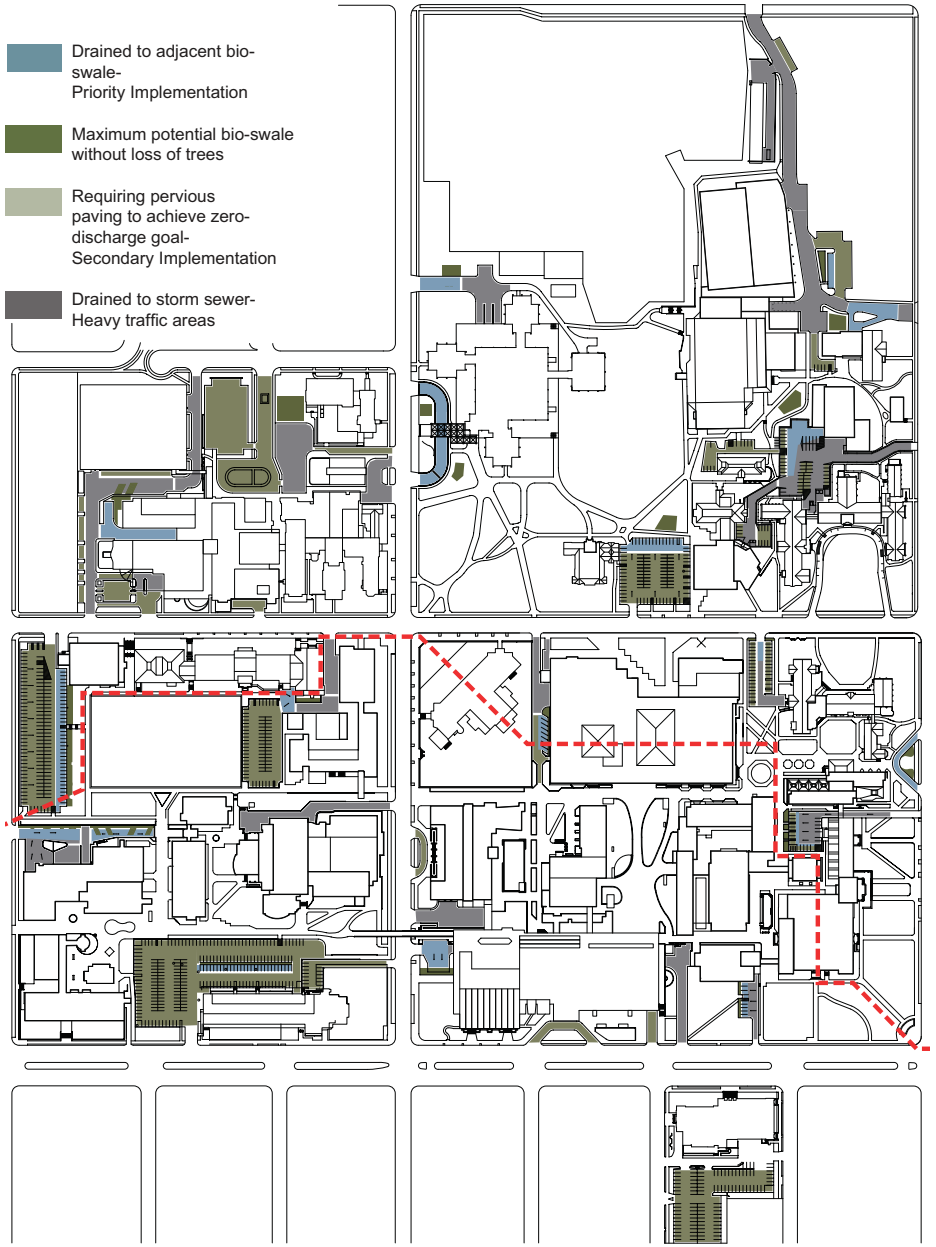
Professional community participants, 'Waterscapes' Design Charrette, April 28, 2005.



ZDZ Project Advisory Board members with the P.I. and Guest Keynote Speaker [redacted] 'Waterscapes' Design Charrette, April 28, 2005.



ZDZ Project team [redacted] and



VEHICULAR HARDSCAPE ANALYSIS

Pavilion Gateway Project

The Pavilion Gateway Project was funded by the Milwaukee Metropolitan Sewerage District in parallel with the Zero-Discharge Zone Masterplan, with the intent of creating a detailed design for demonstration projects growing out of the masterplan.

This unique circumstance allowed the high level masterplanning and detailed design investigation to influence each other in ways that a more sequential process would not have. One result of this is the suggestion at the Masterplanning level that drainage pipes could be daylit from inside of buildings, keeping gravity on the side of the designer. This suggestion was not explored initially for the Power Plant, but it eventually became the centerpiece of the Power Plant Cistern Project.

A second result is that the idea of layering individual masterplan strategies through focussing on a single drainage tree becomes the centerpiece of the project's methodology.

The Pavilion Gateway Project is designed to capture every surface draining into the four acre basin associated with Lot 18 and the northeastern drainage tree of the campus.

On the site plan on the facing page, this includes the roof areas indicated in blue, creating the stormwater interpretive path in red. The Power Plant roof was not yet included as captured in this iteration of the design.

PROJECT TEAM

University of Wisconsin-Milwaukee
[redacted]
Associate Professor
Principal Investigator and Lead Designer

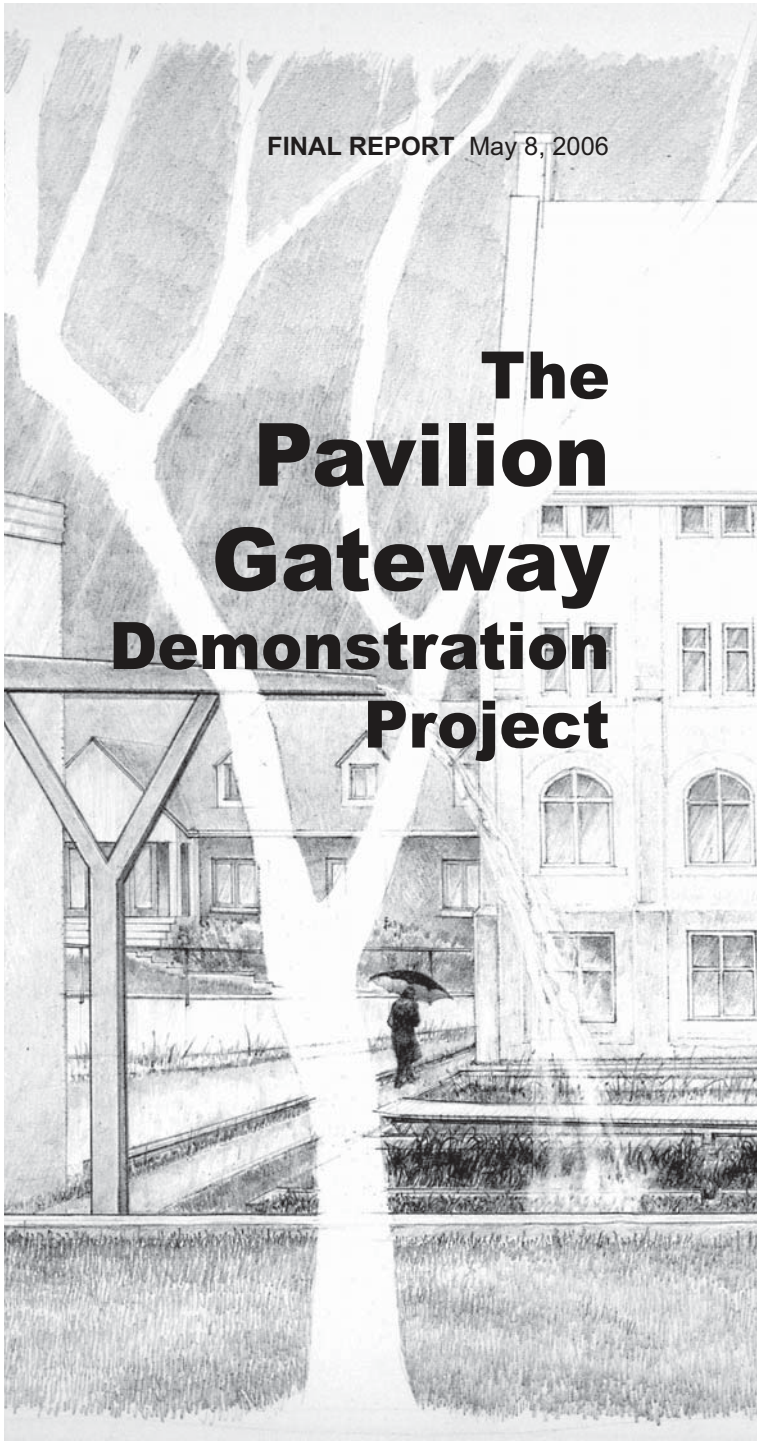
[redacted]
Assistant Professor

Student Team
[redacted]

Engberg Anderson Design Partnership Inc.
Architects of Record
[redacted]

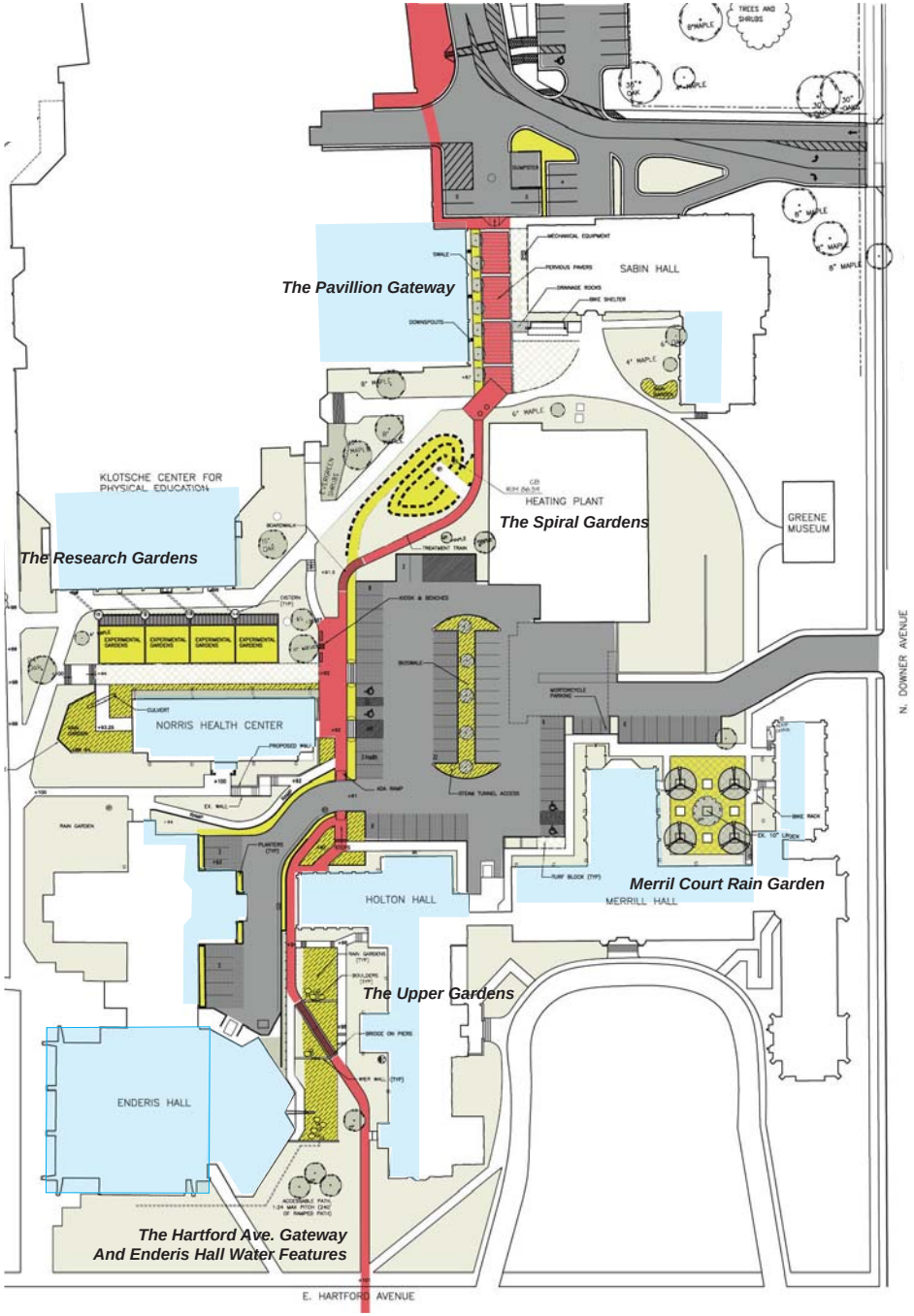
Arnold & O'Sheridan Inc.
Landscape Architecture and Civil Engineering
[redacted]

Education Design Link
Interpretive Program Design
[redacted]



FINAL REPORT May 8, 2006

The Pavilion Gateway Demonstration Project

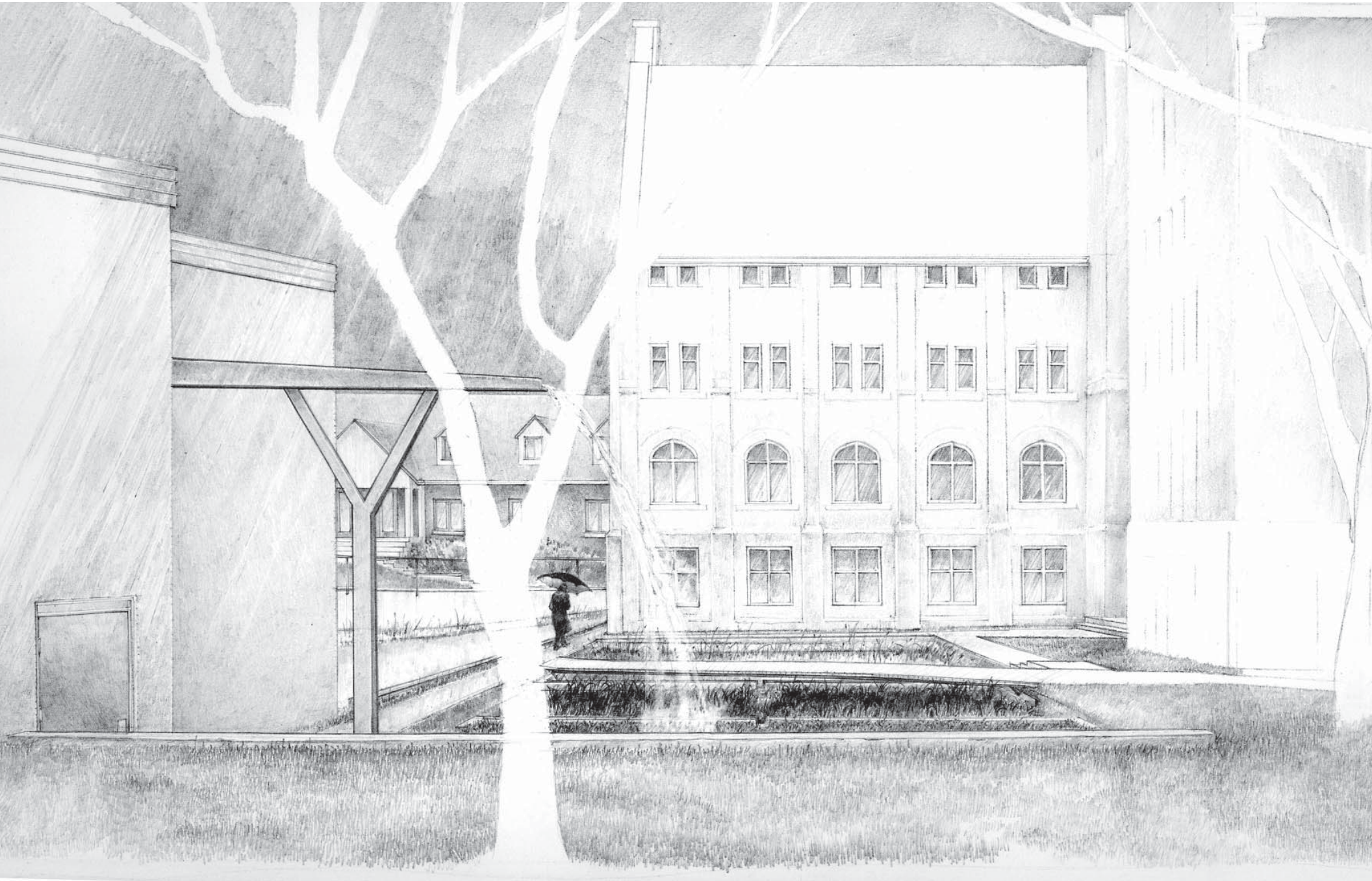


The Pavilion Gateway Demonstration Project. Final Report to the MMSD, 2006

The Spiral Garden
Power Plant west wall and landscape, before and after construction of the Spiral Garden

The first phase of this project to be constructed was the reconstruction of Lot 18, the parking lot that doubles as a service yard for the Campus Power Plant and several loading docks.

The parking lot is drained into a series of linear gardens on its western side, which in turn drain into the Spiral Garden; a large bio-swale downstream from the parking lot and adjacent to the Power Plant. Gardens ringing the parking lot and receiving water from downspout disconnections are also plumbed into this treatment train.



The Gates of the Pavilion Gateway Project

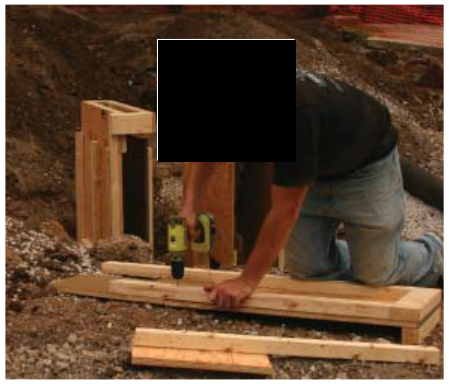
The Pavilion is a new recreation center and 500 car underground parking structure that by its nature becomes a newly important point of entry into the UWM Campus. Coincidentally, it is also at a low-point of the campus geographically. The idea behind the Pavilion Gateway Project is that the pedestrian experience of walking to the heart of campus from this new point of arrival can be transformed from that of a neglected service area to that of a rich stormwater interpretive path. On one level, the entire project is a 'gateway' into a new world.

Paths need thresholds and portals to be vivid experiences. In the two renderings on the previous spread, we see the initial conceptions for the Enderis Hall Gate at the geographic top of the path to the south, and the Pavilion Gate at the geographic bottom of the path. While the Enderis Hall garden and its gate element have not yet been built, note that the idea of stormwater daylighting of internally drained roof water into a sculptural sluice is the driving idea behind it. This idea is realized in the Power Plant Cistern Project. While the plaza envisioned in the Pavilion Gate rendering has also not been realized, the Cisterns become the embodiment of this idea.

The Construction of the Spiral Garden

The Spiral Garden was built as a State Contract as part of the reconstruction of Lot 18. At the same time, the author and many students played active roles not only in the design but in the construction of sculptural elements within the project.

The path of the water is equally marked by thresholds- the weir structures that allow flow from one cell to the next to be regulated experimentally. These weir structures were designed and built by the author and students of architecture- true hands on learning in the best and worst of ways.



The Guardian of the Garden

While the planting design was provided by Landscape Architect [redacted] specification of native threatened and endangered species was orchestrated by Conservation and Environmental Sciences student [redacted]

Summer 2010 Arch. 615/815 Design + Build Studio

One intention of the Pavilion Gateway Plan was to create opportunities for architectural elements that would be designed and built by students of Architecture. The summer following the completion of the Spiral Garden the author led such a design studio course. Six graduate students worked with the author to design and construct elements of the landscape, including a series of screen walls to obscure mechanical equipment as viewed from the gardens and an observation pier supported by the manhole structure over the downstream connection of the Spiral Garden back into the underground drainage tree.

Additionally, an undergraduate student conducted experiments to map the contours of the gardens as built as part of the McNair Scholarship program.

The Spiral Garden from Above
June 28, 2011

The Power Plant Sluice

One design idea explored during the 2010 design + build studio was the idea of diverting the internal roof drainage out the western wall of the Power Plant and into the Spiral Garden. Here students erect an initial mock-up of such a structure.

2010 MMSD Green Roof Initiative

In the Fall of 2010, the Milwaukee Metropolitan Sewerage District (MMSD) issued a call for proposals for the installation of green roofs as stormwater demonstration projects. With the ZDZ Masterplan in hand, UWM responded with a request for $2.5M in funding spread across multiple roofs.

In the process of assembling this proposal the structural capacity of the Power Plant roof was evaluated and confirmed to be structurally incapable of supporting a green roof. As shown in the proposal Site Plan and Concept Collage, the proposal included the daylighting of the Power Plant's internally drained roof as explored by the students in the Design + Build studio.

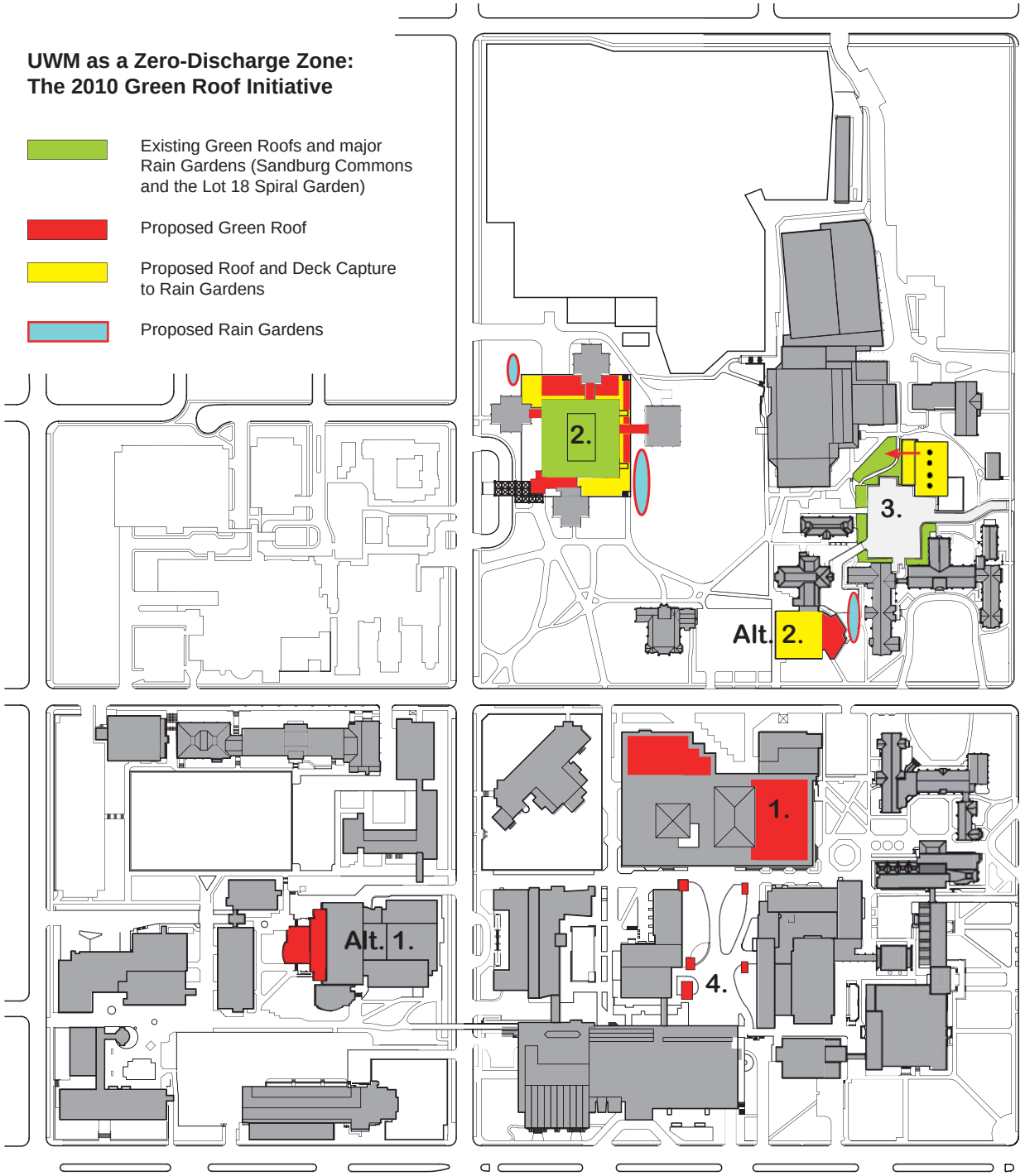
UWM ultimately received half of this requested funding, or $1.26M. for green roofs on the Golda Meir Library and for additional roof area completing the Sandburg Commons Green Roof Project.

KEY

1. Golda Meir Library Green Roofs C and G: The Learning Commons
2. Sandburg Connectors Green Roofs, Patio Planters and Patio Capture to Rain Gardens. (Phase II- Completing the existing Sandburg Green Roof)
3. Power Plant Sculptural Scupper internal drain daylighting to Spiral Garden
4. Spaights Plaza Pavilion Planter Boxes

Alt. 1. Lapham Hall Green Roof (2010 re-roofing. Identified late in the process)

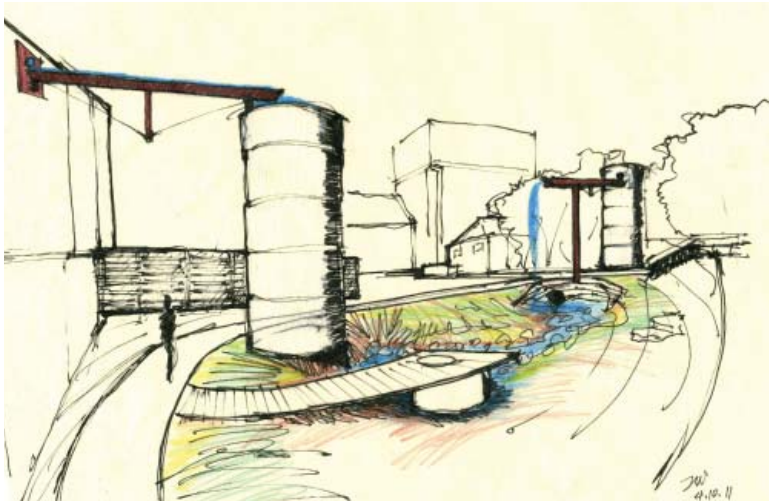
Alt. 2. Enderis Hall Green Roof and Roof Capture (2011 earliest start date. This is the 'Upper Garden' of the Pavilion Gateway Project

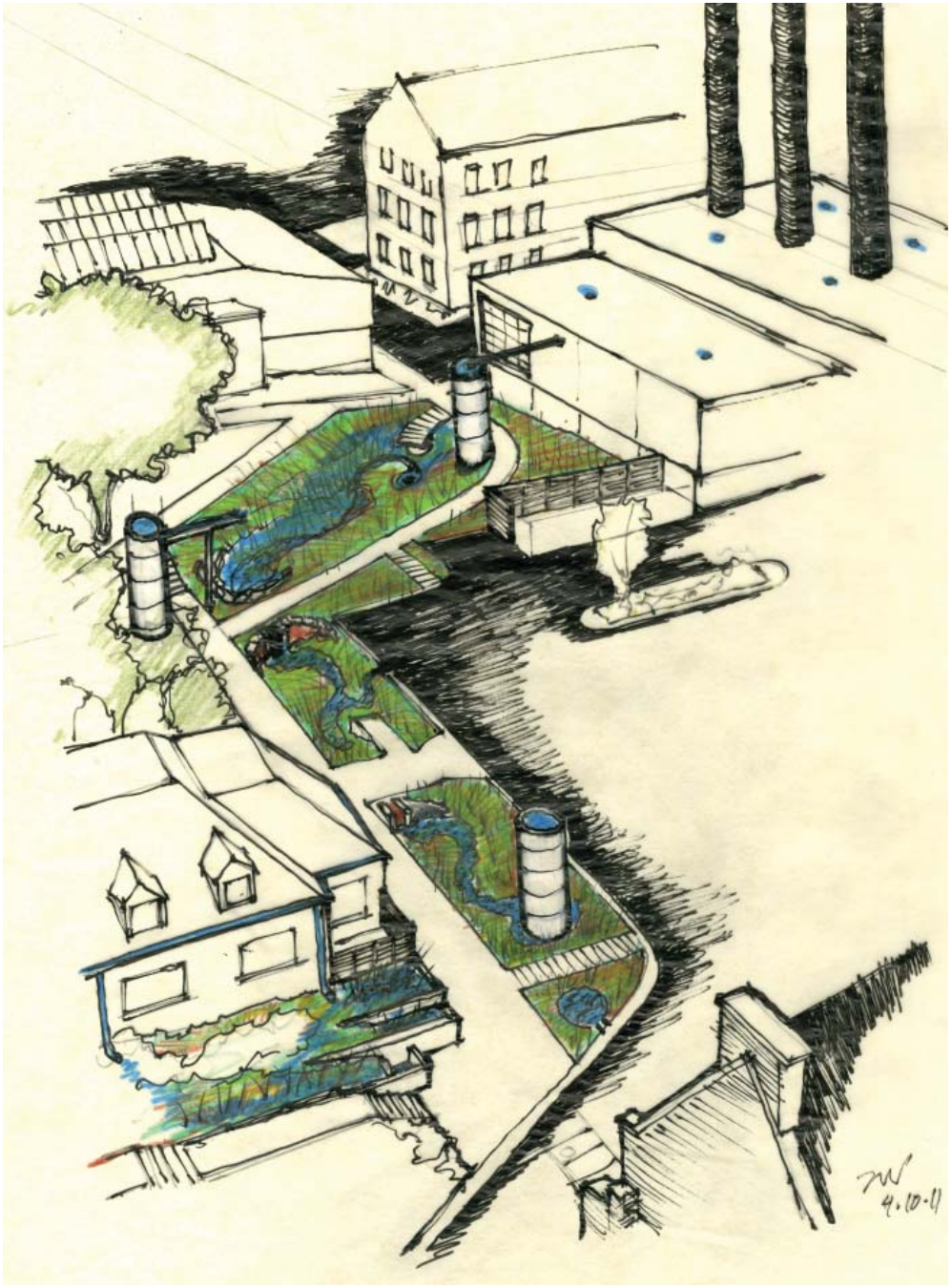


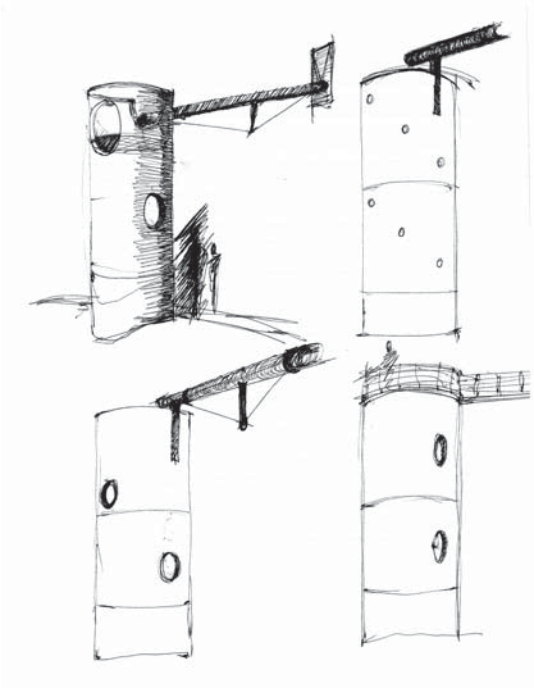
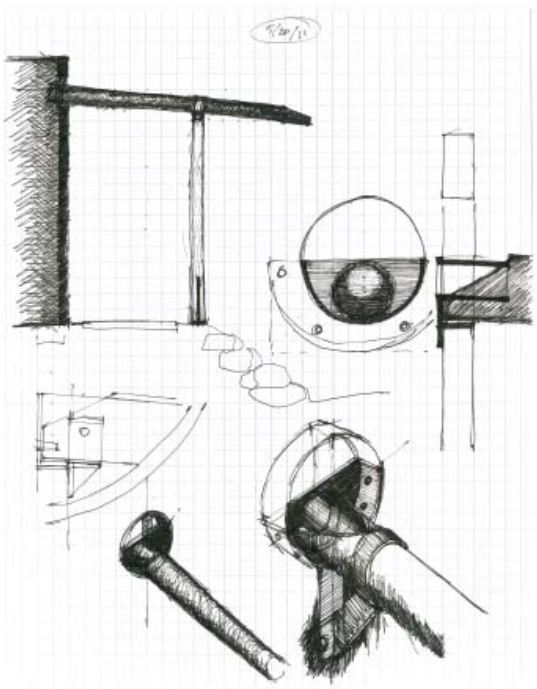
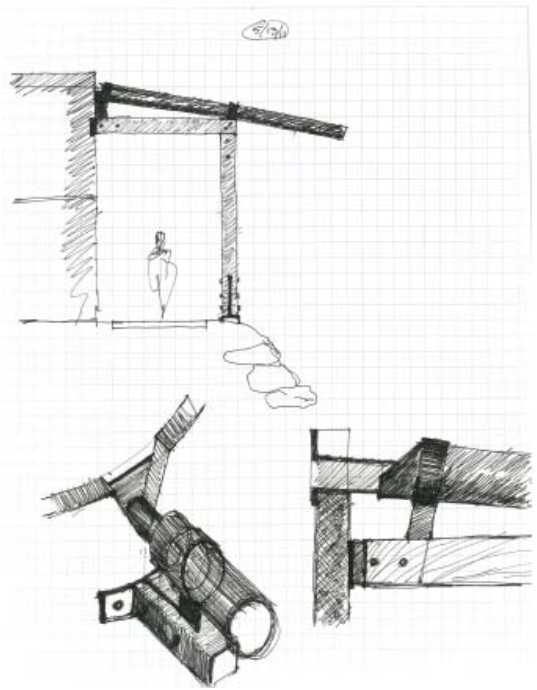
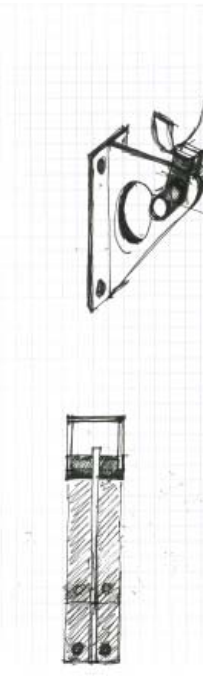
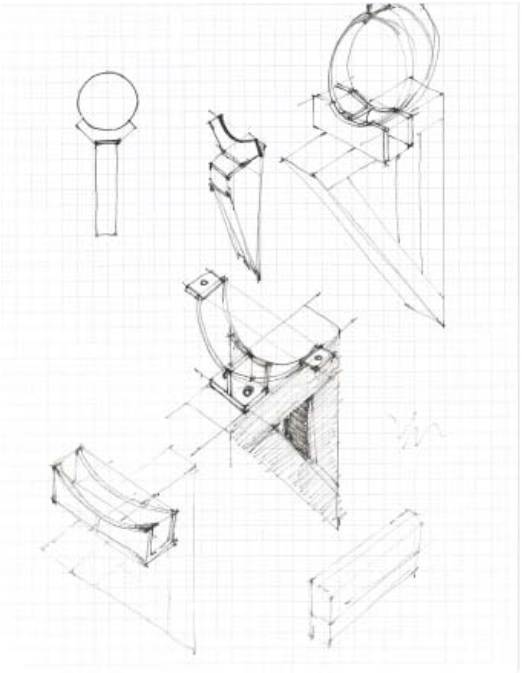
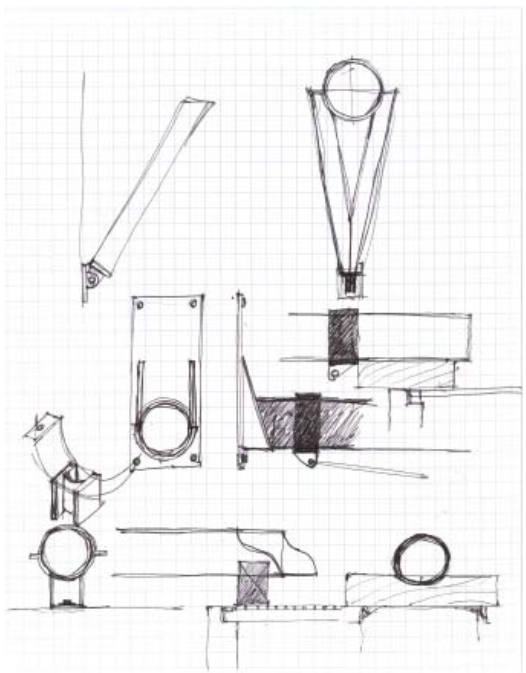
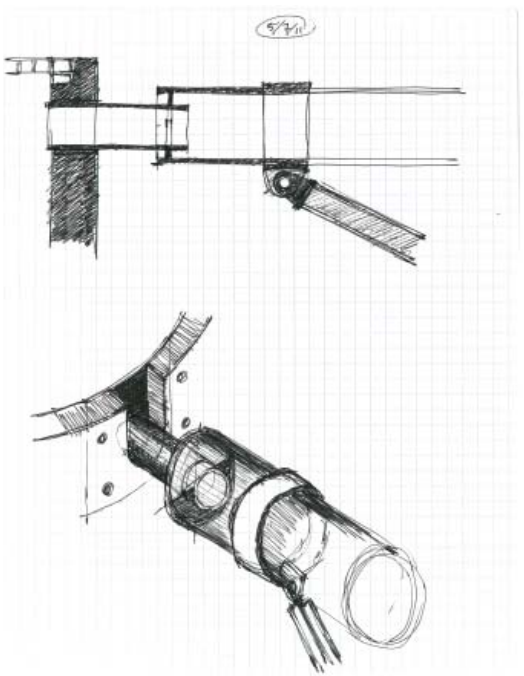
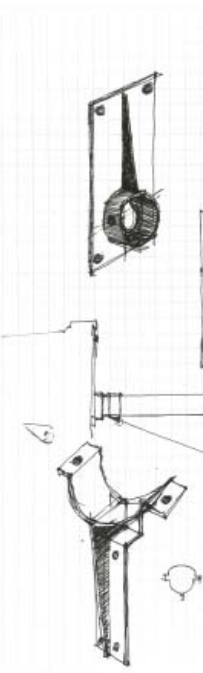
2011 Great Lakes Restoration Initiative Proposal

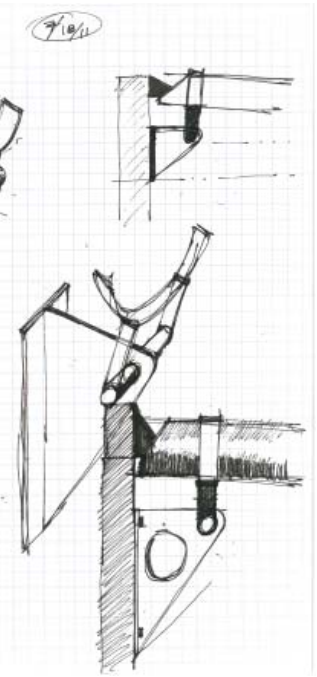
Building on the previous studies, the 2011 GLRI Proposal added cistern capacity to the proposal. As seen in the original Pavilion Gateway Project rendering on the opposite page, the idea of incorporating cisterns as sculptural elements existed from the beginning. Originally these cisterns would have captured runoff from the Klotche Gym and provided a controlled source of rainwater for an experimental test cell structure.

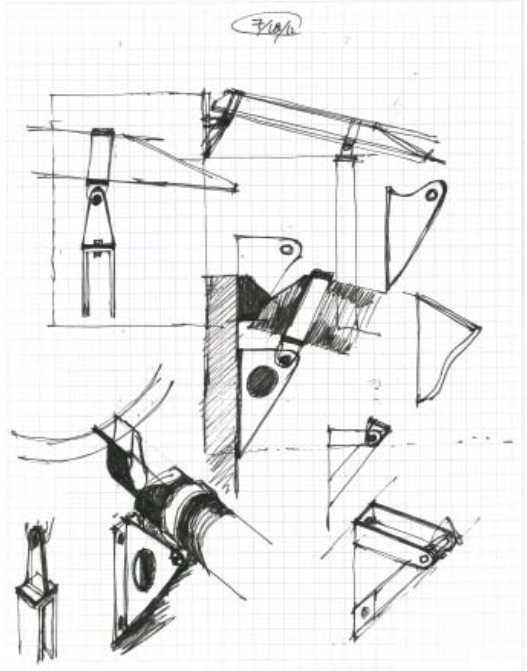
In the final proposal, two linked, 20-foot tall cisterns frame the spiral garden and capture water from the roof of the power plant. One cistern is filled from a scupper drain from the power plant's 13,000 square foot roof. The two are connected by an underground pipe and both fill as one vessel. When the system is full, the second cistern overflows to create a celebratory water feature of cascading rainwater into a stone basin at the top of the garden. The cisterns are designed to hold a 2-year storm event, which is roughly 2 inches of rainwater on the 13,000 square foot roof. They drain slowly over a 24 hour period through a second sculptural outlet in the stone basin and into a storm drain at the base of the system.

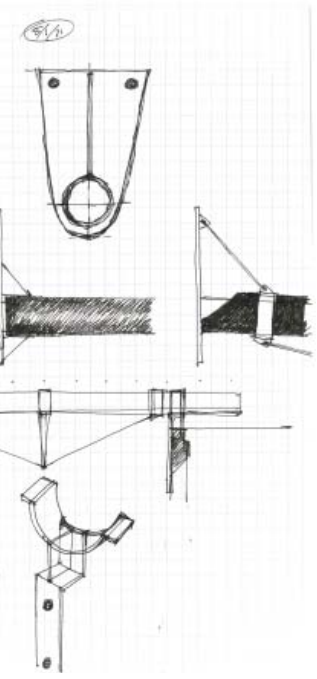


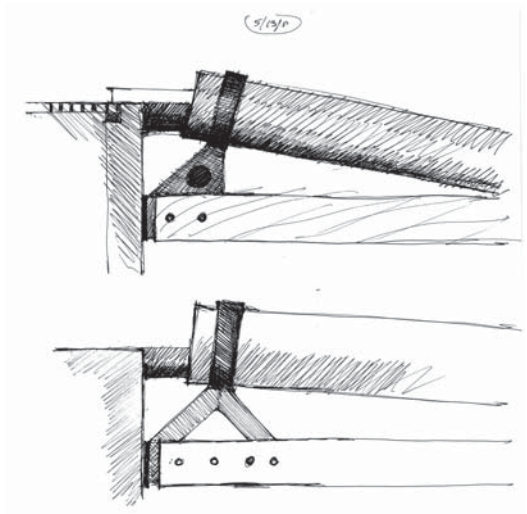


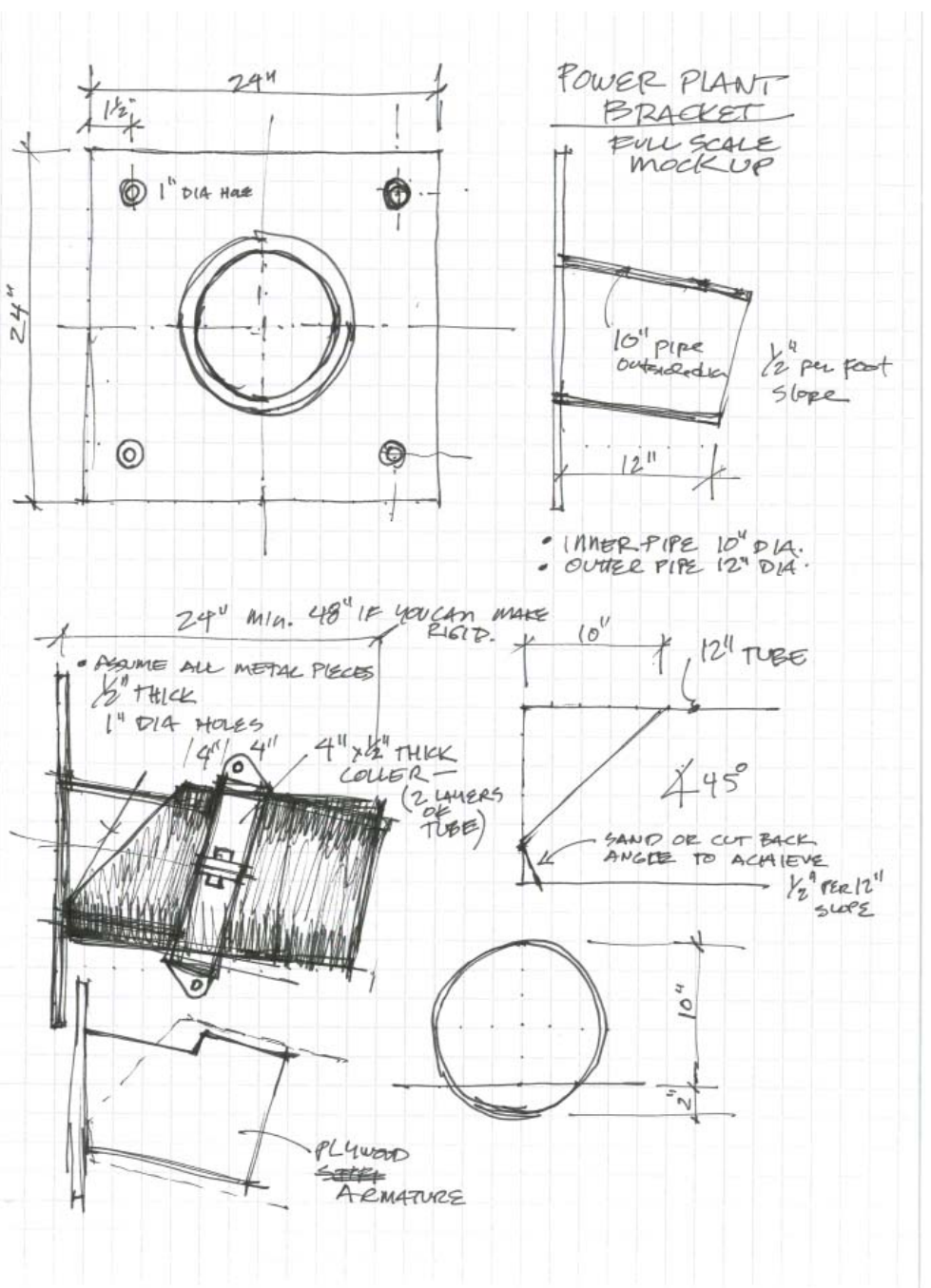









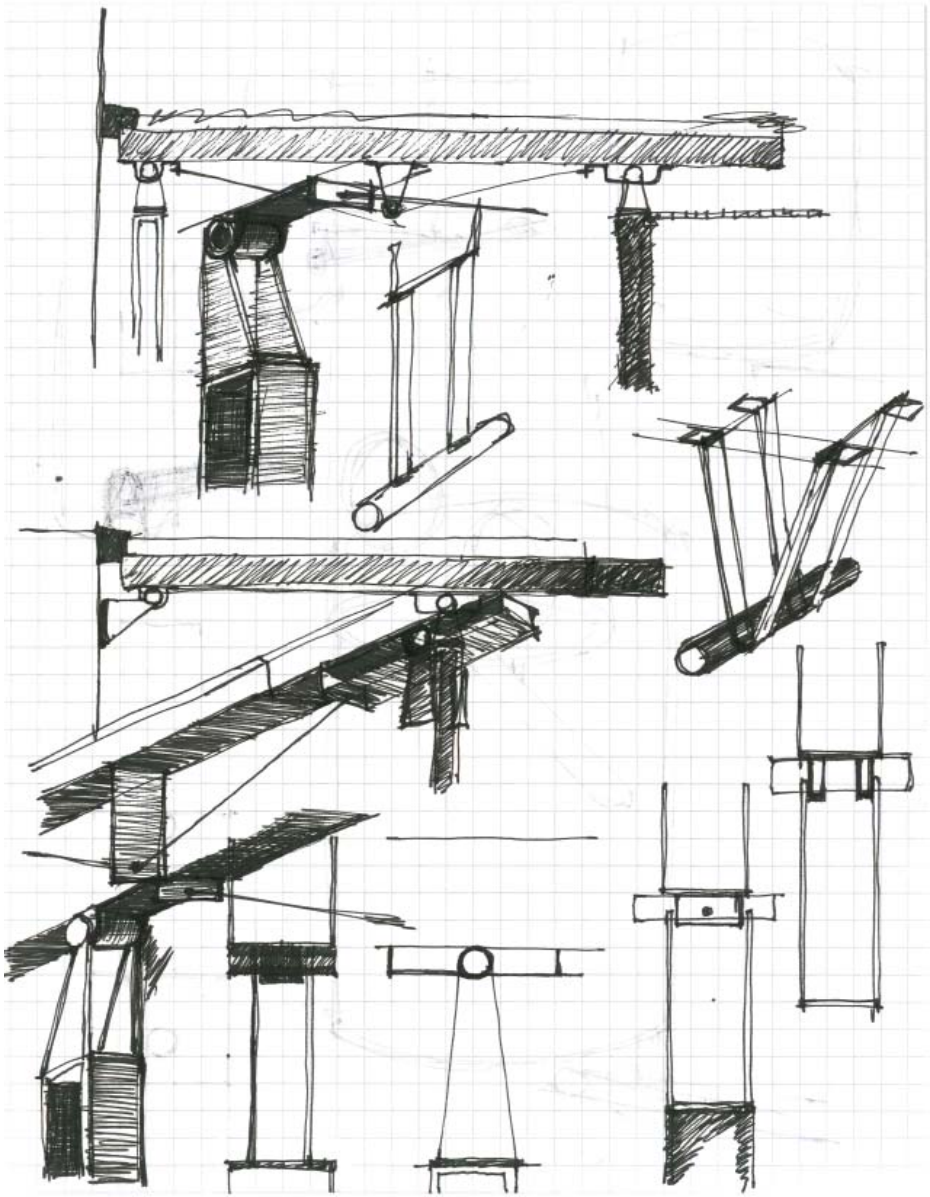


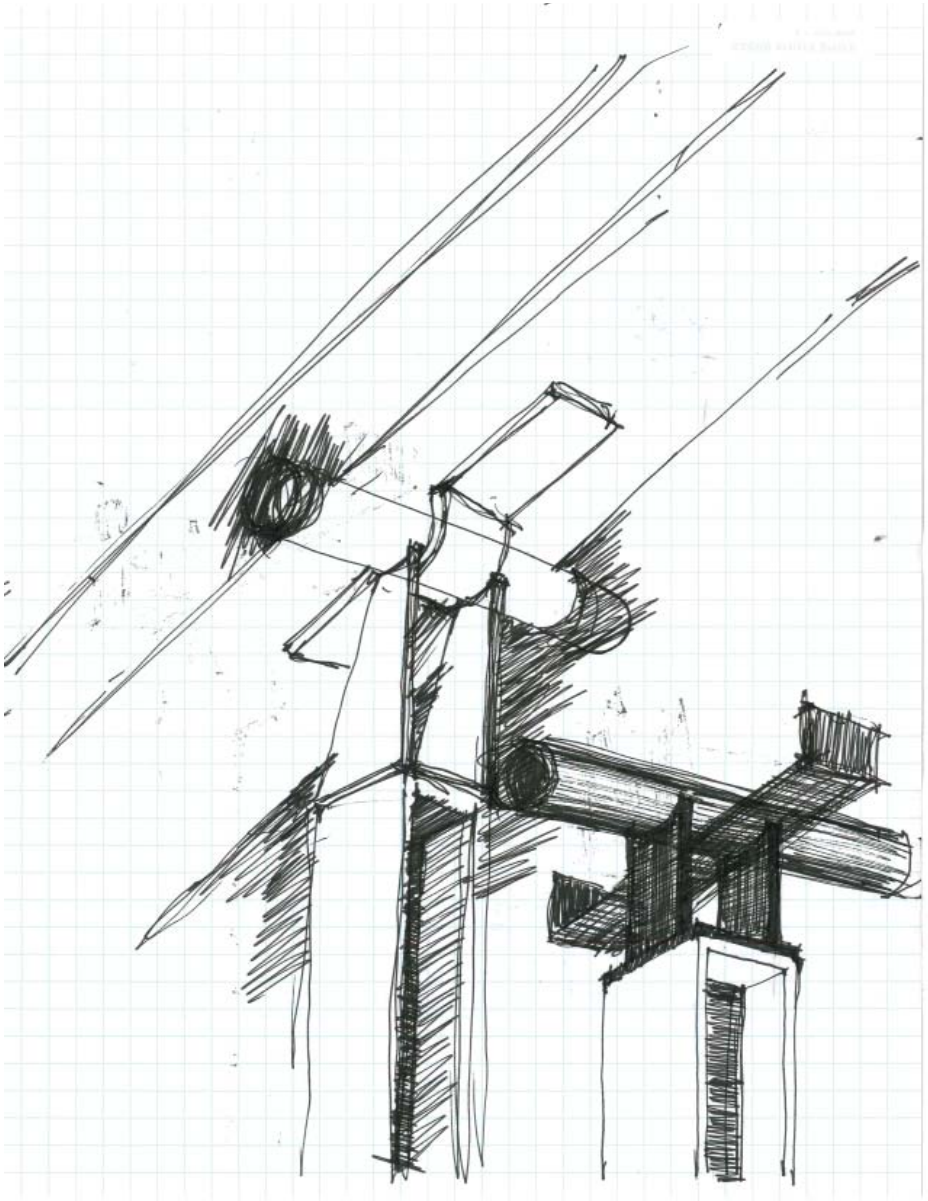


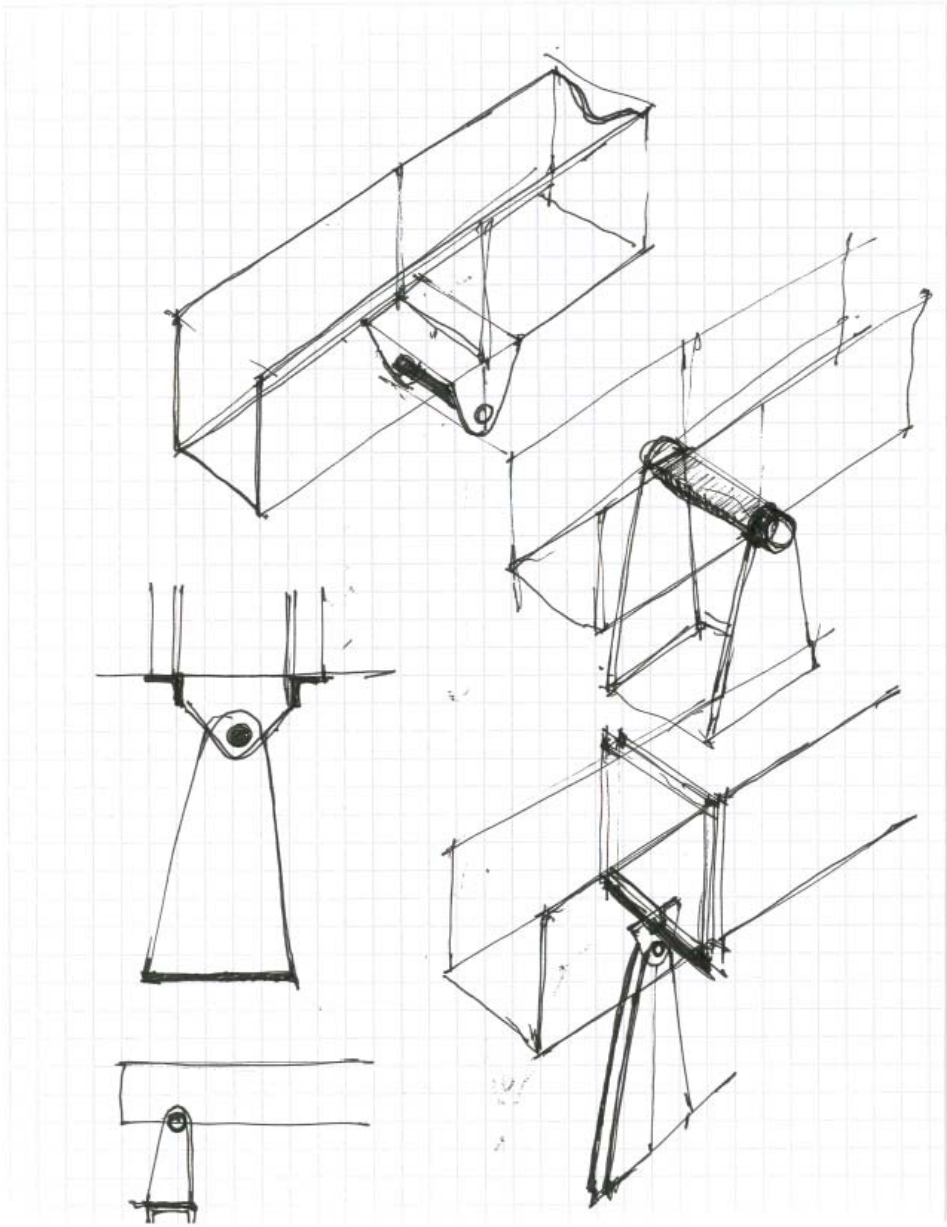


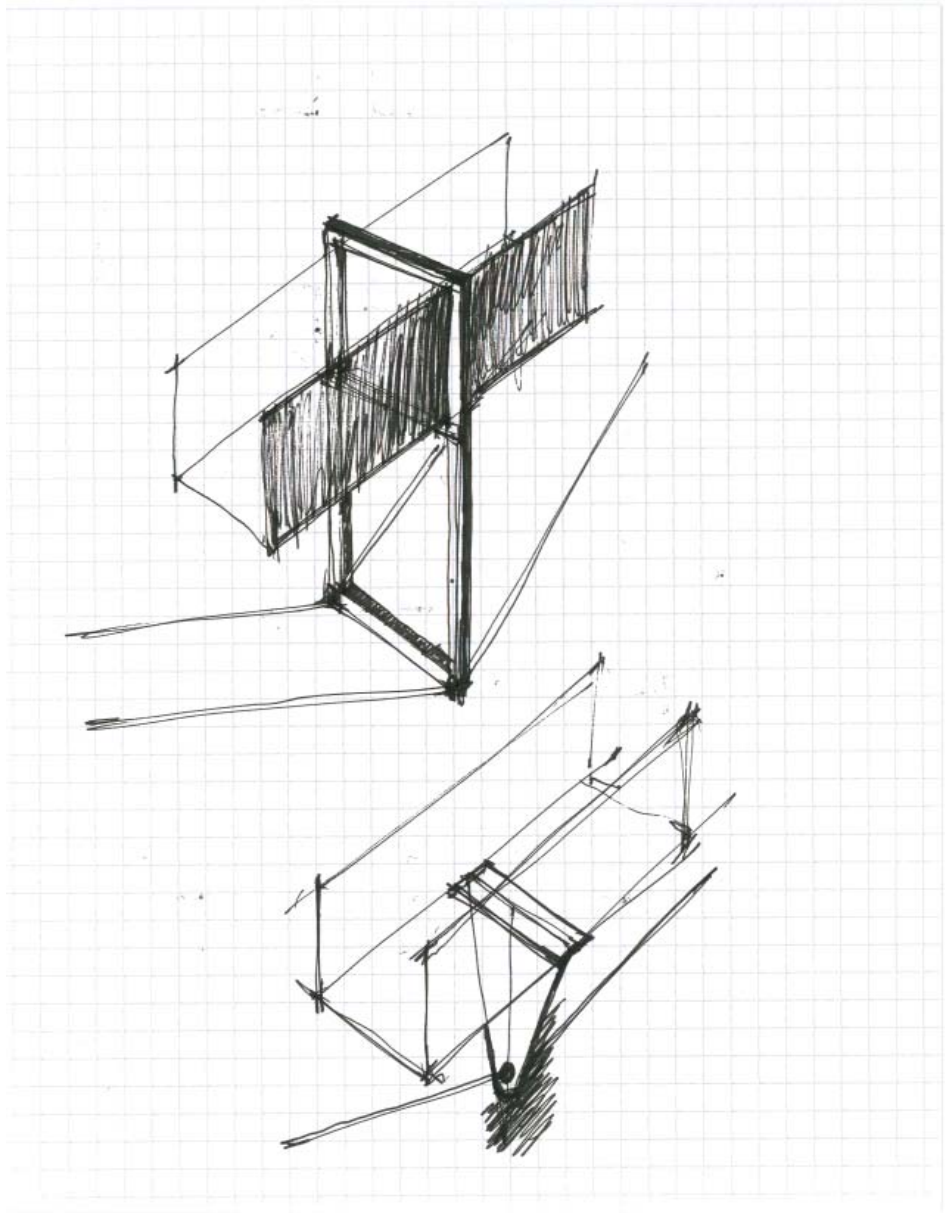


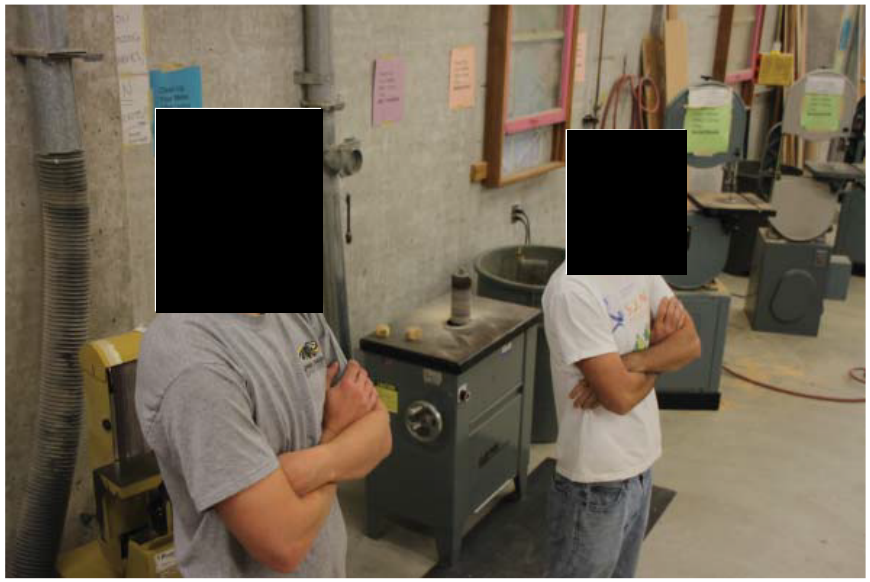

24"
1½"
1" DIA Hole
24"
POWER PLANT BRACKET
FULL SCALE MOCK UP
10" pipe outside dia
½" per foot slope
12"
• INNER PIPE 10" DIA.
• OUTER PIPE 12" DIA.
24" Min. 48" IF YOU CAN MAKE RIGID.
• ASSUME ALL METAL PIECES ½" THICK
1" DIA HOLES
4"
4"
4" x ½" THICK COLLER (2 LAYERS OF TUBE)
10"
12" TUBE
45°
SAND OR CUT BACK ANGLE TO ACHIEVE ½" PER 12" SLOPE
10"
5"
PLYWOOD
ARMATURE

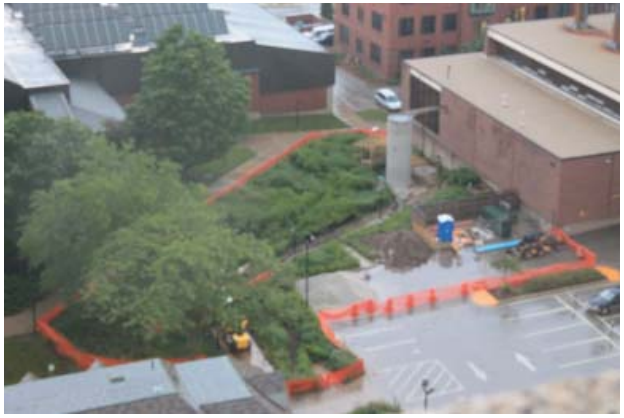


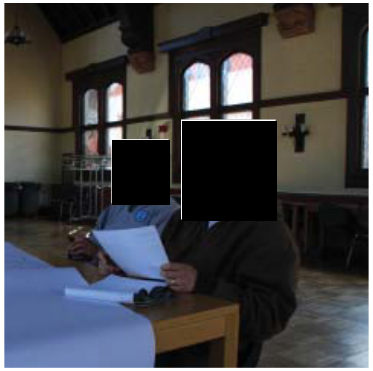












GESTRA

GESTRA Engineering, Inc.
1626 W. Fond Du Lac Avenue
Milwaukee, WI 53205
Phone: (414) 933-7411
Fax: (414) 933-7811

+ [redacted] AS SUB-CONSULTANT

June 21, 2011

[redacted]

Re: Proposal for Engineering Design Services
UW-Milwaukee Power Plant Stormwater Cistern Project
Milwaukee, Wisconsin

Dear [redacted]

Thank you for the opportunity to provide you this proposal for engineering design consulting services associated with the above-referenced project. Our proposal is based on our understanding of the scope of work objectives described in the site visit walk-through with yourself and Mr. James Joehnk of Joehnk Engineering on March 15, 2011 as well as the corresponding Conceptual Exhibits dated March 14, 2011 that you provided. JIM WASLEY

The general items of work described within this proposal include design work associated with geotechnical evaluations, structural design, general plumbing and civil site design efforts to prepare construction documents with agency coordination/permit submittals. If additional services beyond those listed below are determined necessary for this project as it moves forward, we would be happy to prepare an Amendment to our Agreement that will satisfy any requests for changes once those items become clearer.

Project Information:

The University of Wisconsin-Milwaukee (UWM) has requested Gestra Engineering, Inc. (GESTRA) along with our subcontractor Joehnk Engineering design three identical or similar concrete cisterns, a typical foundation design for all cisterns, structural design work associated with connection of a principle roof lead piping or a sluiceway from the UWM Power Plant and an overflow sluiceway from a second/third cistern, and all corresponding site civil design and piping work.

STATE OF WISCONSIN
DEPARTMENT OF ADMINISTRATION
DIVISION OF STATE FACILITIES (DSF)
DOA-4576 (R7/98WEB)

Mailing Address:
Post Office Box 7866, Madison, WI 53707-7866
Street Address:
101 E. Wilson Street, 7th Floor, Madison, WI 53702
Phone: **608/266-2731**; *Fax:* **608/267-2710**
http://doa.wi.gov/dfd/dfdmain.asp

REQUEST FOR SMALL PROJECT APPROVAL

Project Information:

Project:	**UWM Power Plant Cistern System**		
Agency:	**285 - UNIVERSITY OF WISCONSIN**	DSF Project No:	**11F3B**
Institution:	**MILWAUKEE CAMPUS**	DSF Project Mgr:	[redacted]
Building Name:	**HEATING PLANT - CENTRAL**	Building No:	**1915**
Contact Person:	[redacted]	Phone No:	**(414) 229-2361**
Org. Code:		County:	**MILWAUKEE**
Sub-Org.Code:		Activity Code:	

Note: Although this request has an assigned Project Number, it may or may not be approved. Please refer to the DSF Funding Recommendation below.

Estimated Project Budget:

Construction (line 3)	**$70,000.00**
Contingency (line3)	**$15,500.00**
Equipment (line 4)	**$0.00**
Work by Owner (line 2)	**$0.00**
Design Fee (line 1)	**$11,000.00**
DSF Management Fee (line 1)	**$3,500.00**
Other	**$0.00**
Total Budget:	**$100,000.00**
Total Line 1:	**$14,500.00**
Total Line 3:	**$85,500.00**

Funding Sources:

AGF1-Agency/Institution Funds	**$100,000.00**

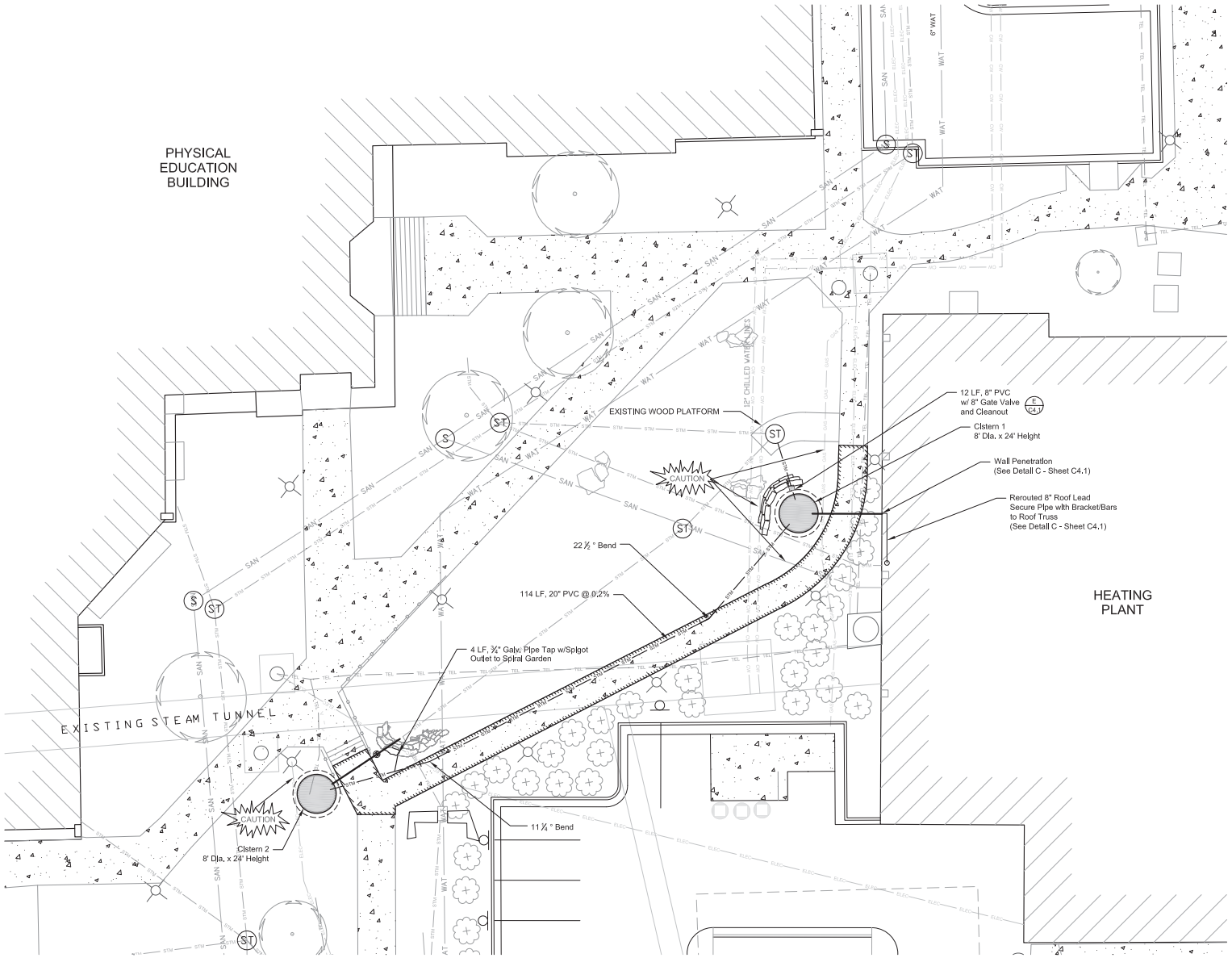
Work Classification: **Repair**

GPR: 100% PR: 0%

[redacted] NEED TO APPROVE FEE OVER BUDGETED AMOUNT OF $11K

Agency/Institution Request Approval: (See attachment No. 4 of the Small Project Guidelines)

The work does not conflict with current or pending work at the site. The work is not part of an enumerated major project. The work will not affect the operation of the mechanical system; if so, detailed information is



tb--22x34

Lead Consultant:

GESTRA
1626 W. Fond Du Lac Avenue
Milwaukee, WI 53226
(414) 933-7444

Consultant:

JOEHNK ENGINEERING GROUP
5075 South Chase Avenue, Suite 311
Milwaukee, WI 53207
414.331.9019

State of Wisconsin
Department of Administration
Division of State Facilities

3359 N. Downer
Milwaukee, WI 53201

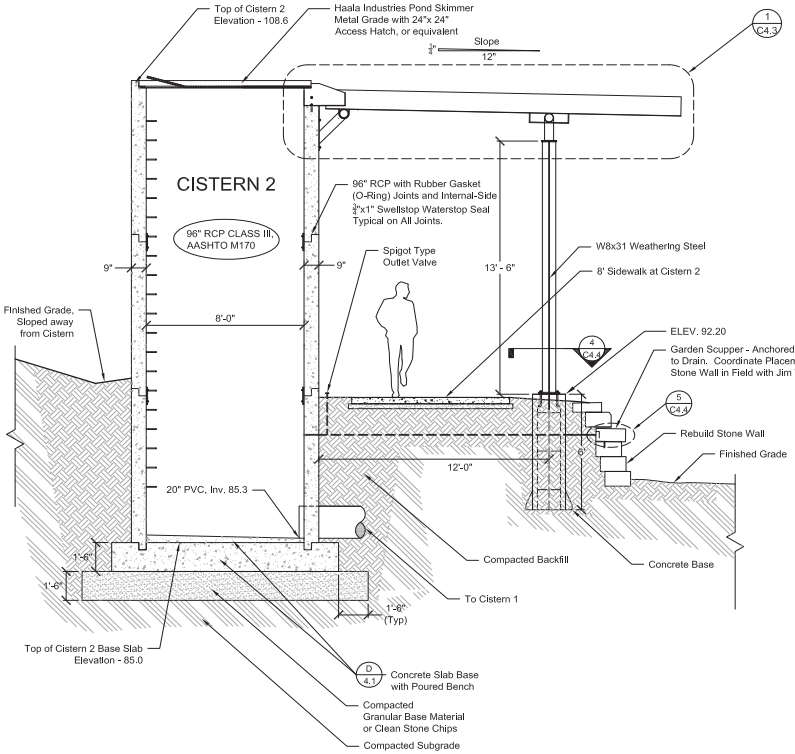
UWM Power Plant Cistern Project
University of Wisconsin–Milwaukee
Milwaukee, Wisconsin

Sheet Title: Proposed Utility Plan

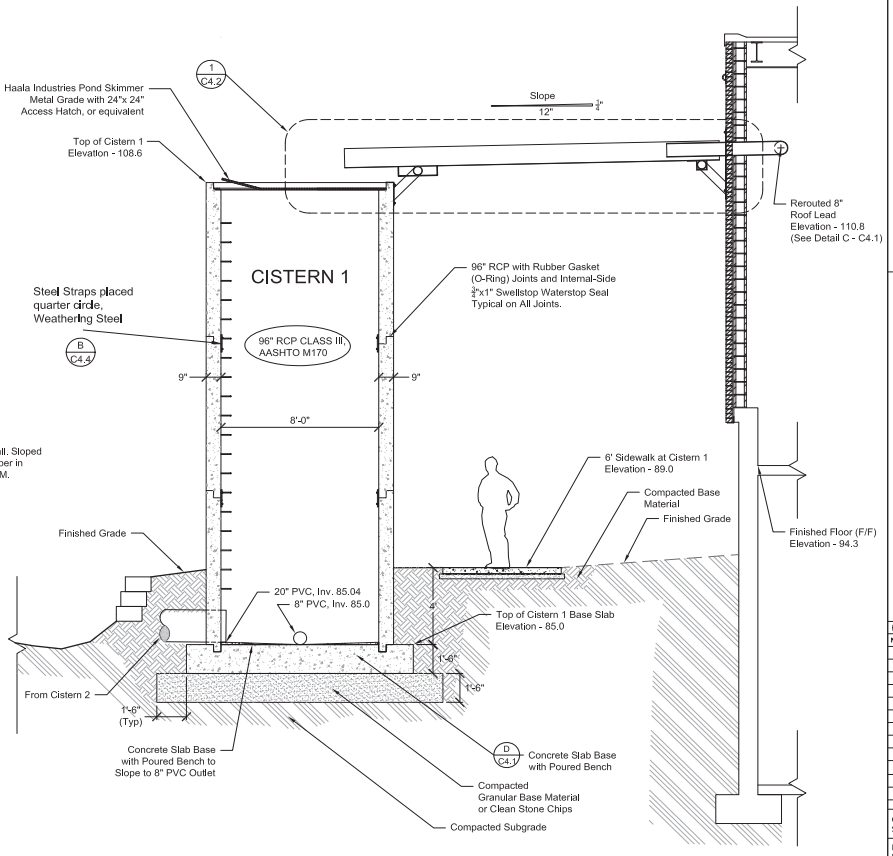
Revisions:

No.	Date:	Description:

Graphic Scale	AS SHOWN
DSF Number	11F3B
Set Type	CD
Date Issued	08/03/2012
Sheet Number	C3.0



A CISTERN 2
SCALE 1" = 3'



B CISTERN 1
SCALE 1" = 3'

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Lead Consultant:

GESTRA
1620 W. Fond Du Lac Avenue
Milwaukee, WI 53226
(414) 933-7444

Consultant:

JOEHNK ENGINEERING GROUP
3073 South Chase Avenue, Suite 311
Milwaukee, WI 53207
414.331.9019

State of Wisconsin
Department of Administration
Division of State Facilities

3359 N. Downer
Milwaukee, WI 53201

UWM Power Plant Cistern Project
University of Wisconsin-Milwaukee
Milwaukee, Wisconsin

Sheet Title:
Notes and Details

Revisions:

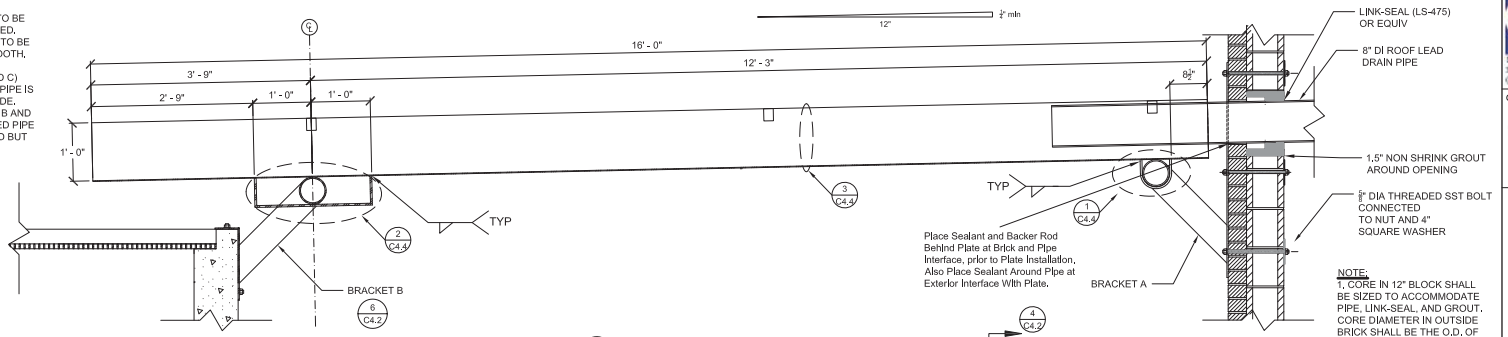
No.	Date:	Description:

Graphic Scale	AS SHOWN
DSF Number	11F3B
Set Type	CD
Date Issued	08/03/2012
Sheet Number	C4.0

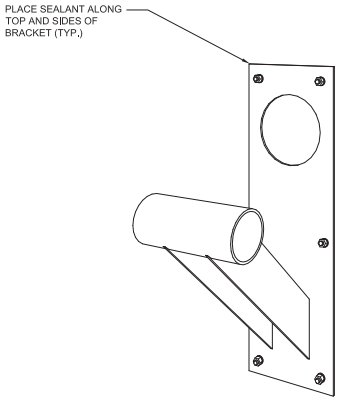
GENERAL NOTES:

(1) ALL SLUICE STEEL PLATES AND HARDWARE TO BE STAINLESS STEEL TYPE 304 EXCEPT AS NOTED. ALL SURFACES VISIBLE FROM THE GROUND TO BE BRUSHED FINISH WITH WELDS GROUND SMOOTH.

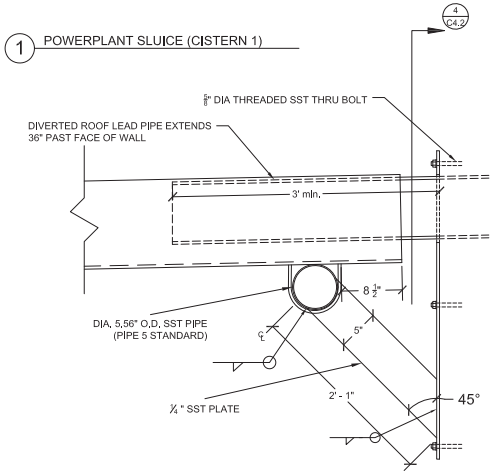
(2) THE TWO PIN CONNECTIONS (BRACKET A AND C) SHOULD BE TIGHT SO THAT THE CAPTURED PIPE IS FREE TO ROTATE BUT NOT MOVE SIDE TO SIDE. THE TWO SLIDING CONNECTIONS (BRACKET B AND D) SHOULD BE TIGHT SO THAT THE CAPTURED PIPE IS FREE TO SLIDE FORWARD AND BACKWARD BUT NOT MOVE SIDE TO SIDE OR UP AND DOWN.



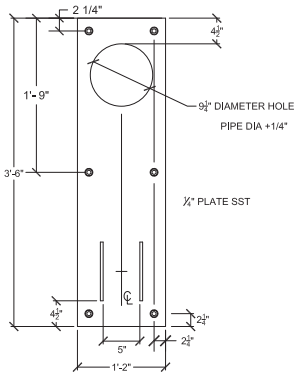
1 POWERPLANT SLUICE (CISTERN 1)



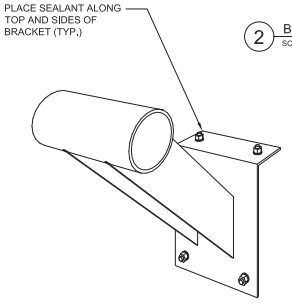
2 BRACKET A AXONOMETRIC
SCALE: NTS



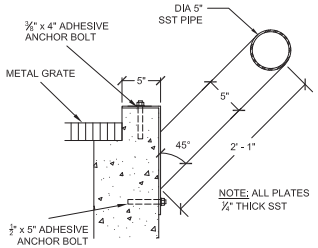
3 BRACKET A SIDE VIEW
SCALE: NTS



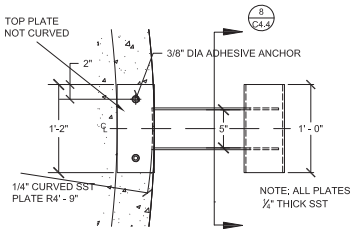
4 BRACKET A FRONT VIEW
SCALE: NTS



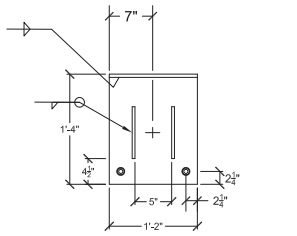
5 BRACKET B AXONOMETRIC
SCALE: NTS



6 BRACKET B SIDE VIEW
SCALE: NTS



7 BRACKET B TOP VIEW
SCALE: NTS



8 BRACKET B FRONT VIEW
SCALE: NTS

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State of Wisconsin
Department of Administration
Division of State Facilities
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Milwaukee, WI 53201

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Milwaukee, Wisconsin

Sheet Title: Notes and Details

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Graphic Scale	AS SHOWN
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Date Issued	08/03/2012
Sheet Number	C4.2

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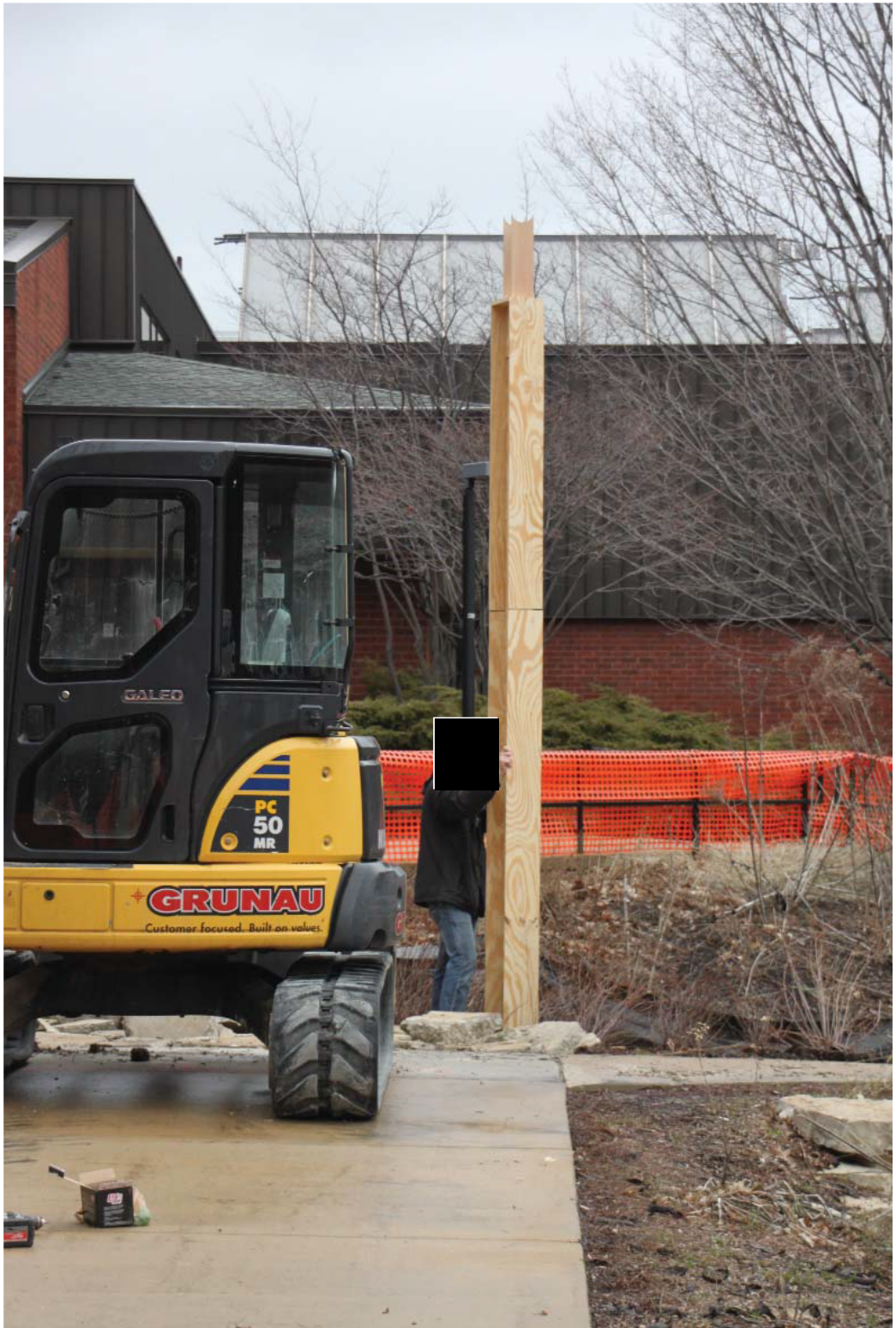
GRUNAU


TOYOTA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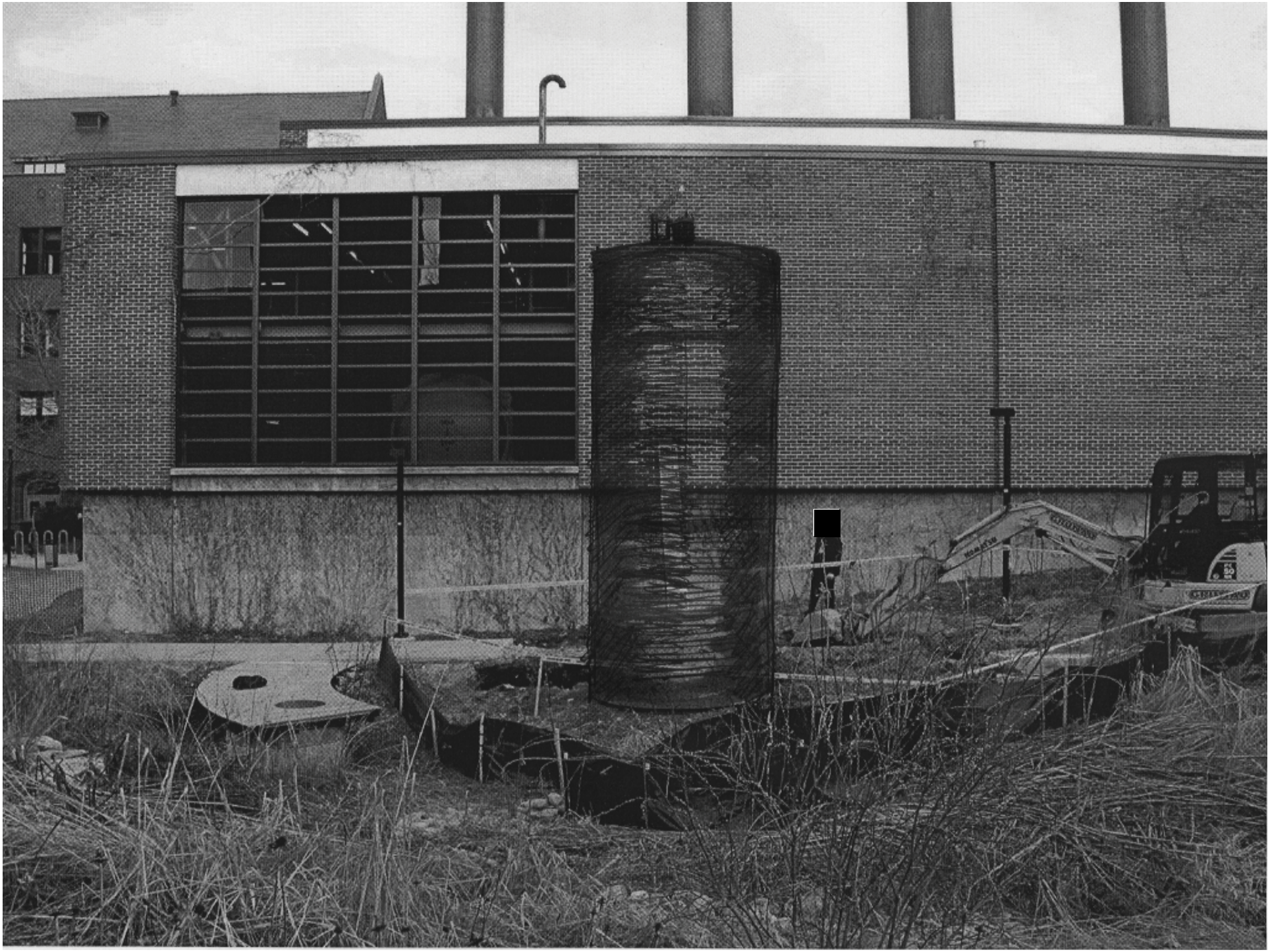
PC
50
MR
GRUNAU
Customer focused. Built on values.


KOMATSU
GRÜNAU


KOMATSU

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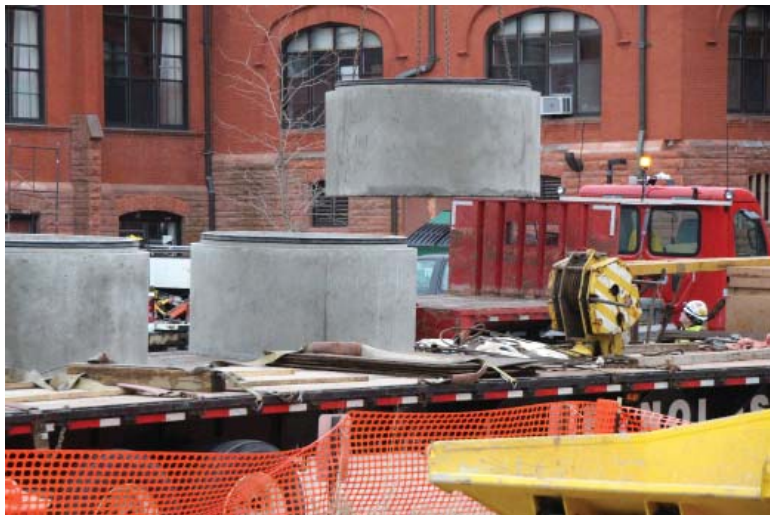


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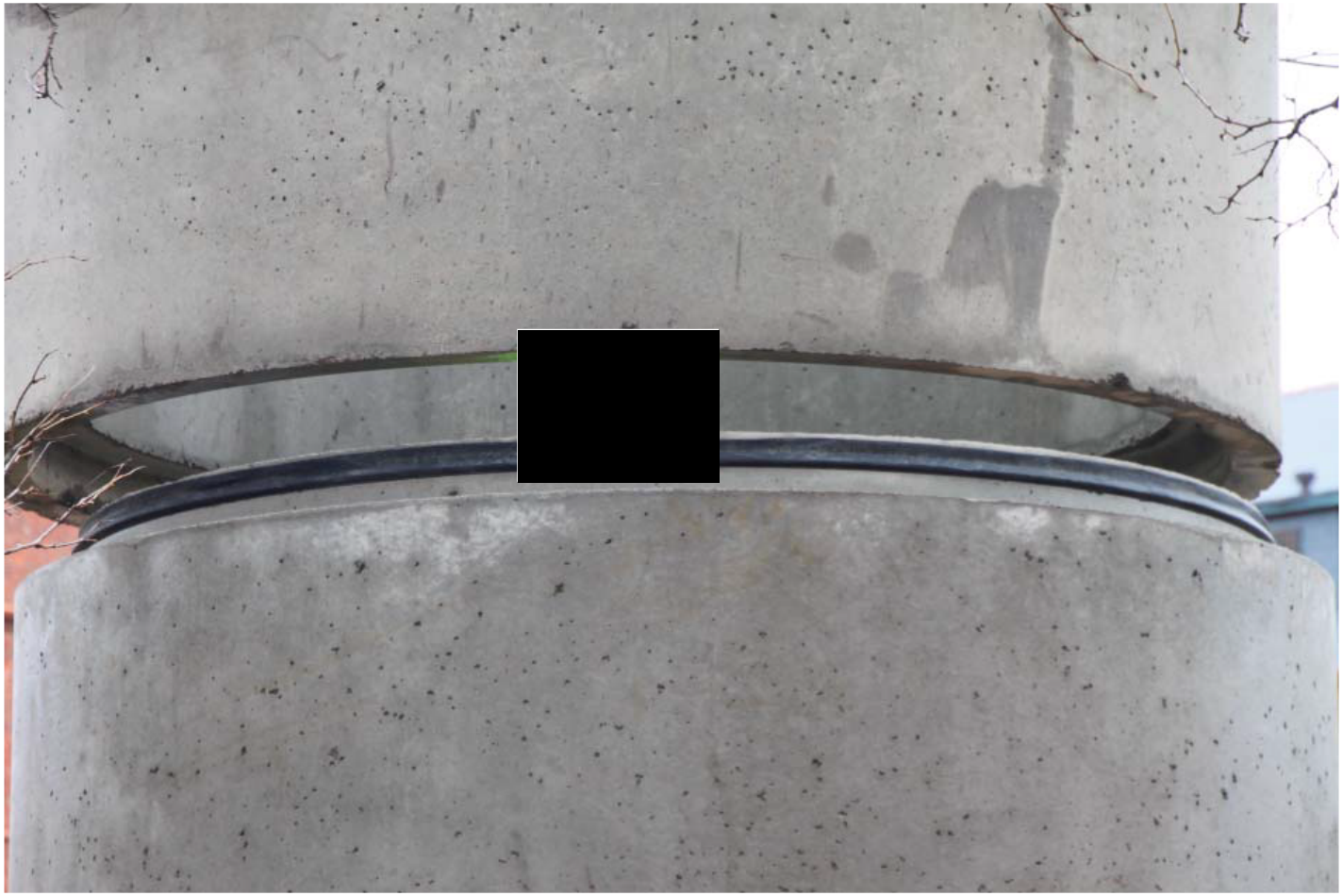


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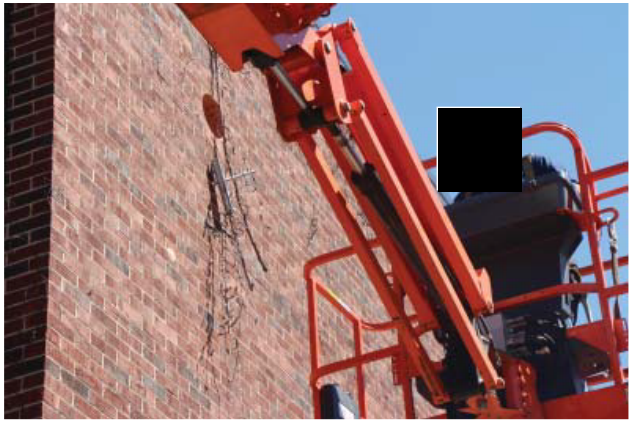

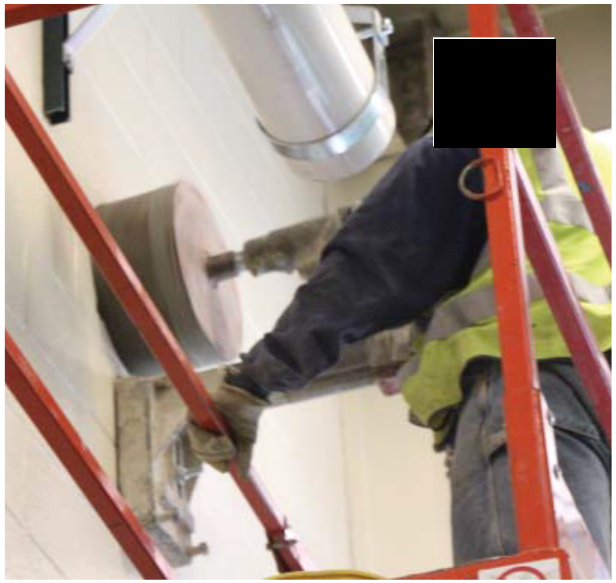

pantherLINK [redacted]

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Power Outages on UWM Main Campus

From : University Relations <universityrelations@uwm.edu> Tue, May 07, 2013 10:30 AM
Sender : universityrelations-bounces@uwm.edu
Subject : Power Outages on UWM Main Campus
To : universityrelations <universityrelations@uwm.edu>
Reply To : [redacted]

Power Outages on UWM Main Campus

Two separate power outages on campus this morning have disrupted electrical service to a number of buildings on the University of Wisconsin-Milwaukee main campus.

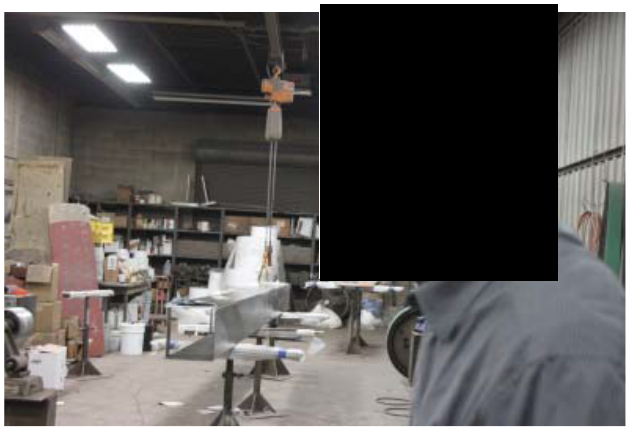
The first outage occurred shortly after 8 a.m. when a contractor struck a utility line near the power plant. Eleven buildings on the east side of campus were affected. Power to all of the buildings, except the west wing of the Golda Meir Library, was restored shortly before 9 a.m. When crews attempted to bring electrical service on line to the library's west wing, a short occurred knocking out power to all of the library and Bolton Hall. Contractors are being brought to campus now to help restore power to those two buildings.

Thank you for your patience while the restoration work continues.

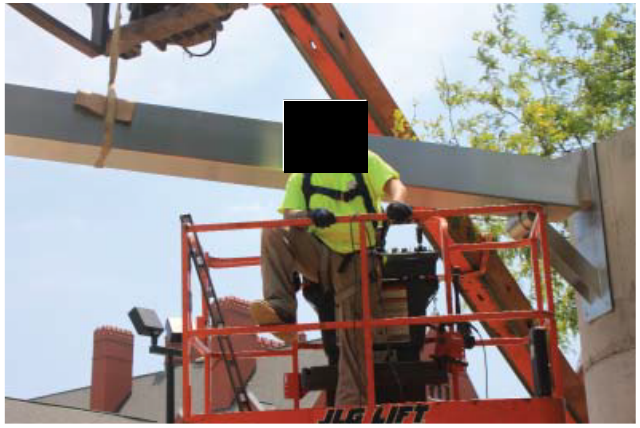
--

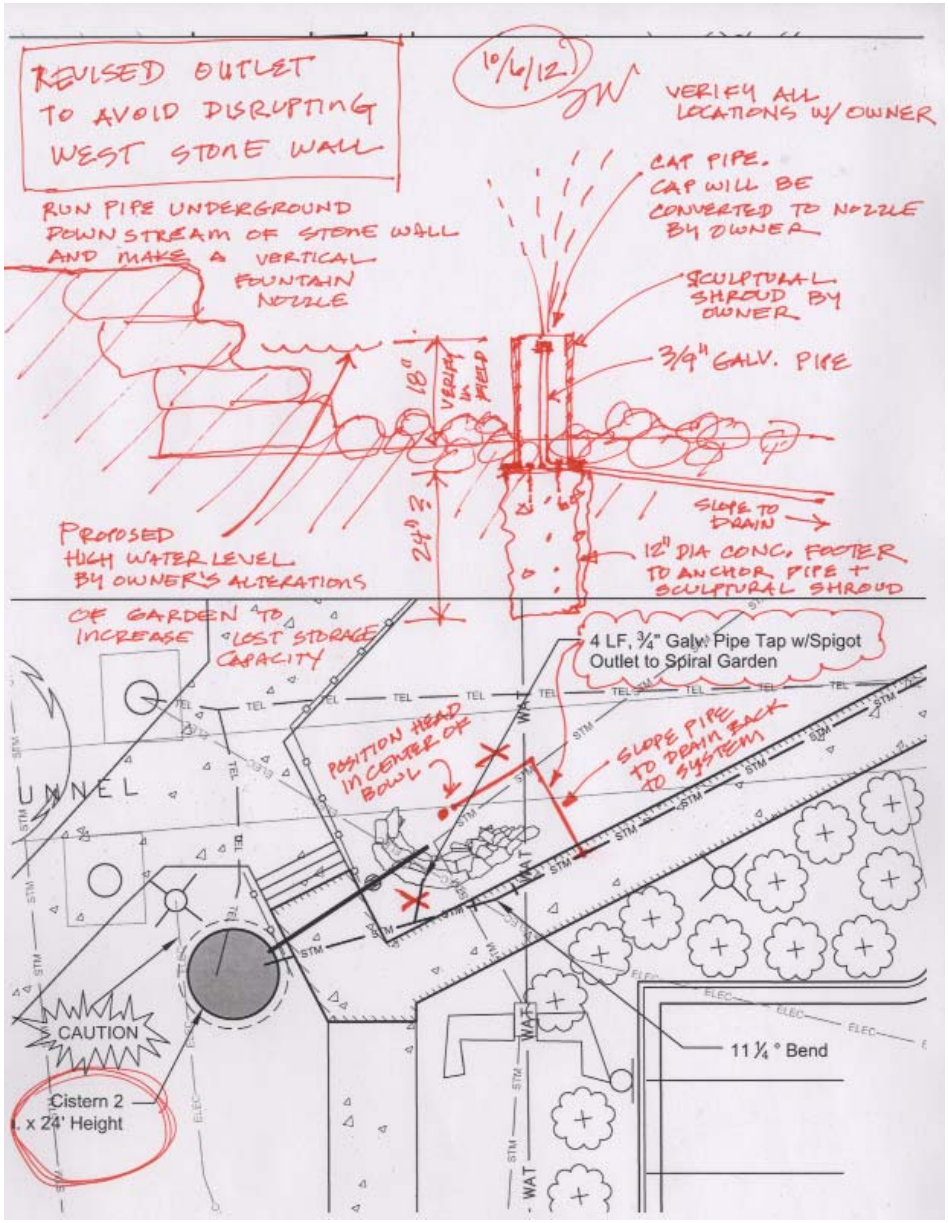
[redacted]
Vice Chancellor
University Relations & Communications
University of Wisconsin-Milwaukee

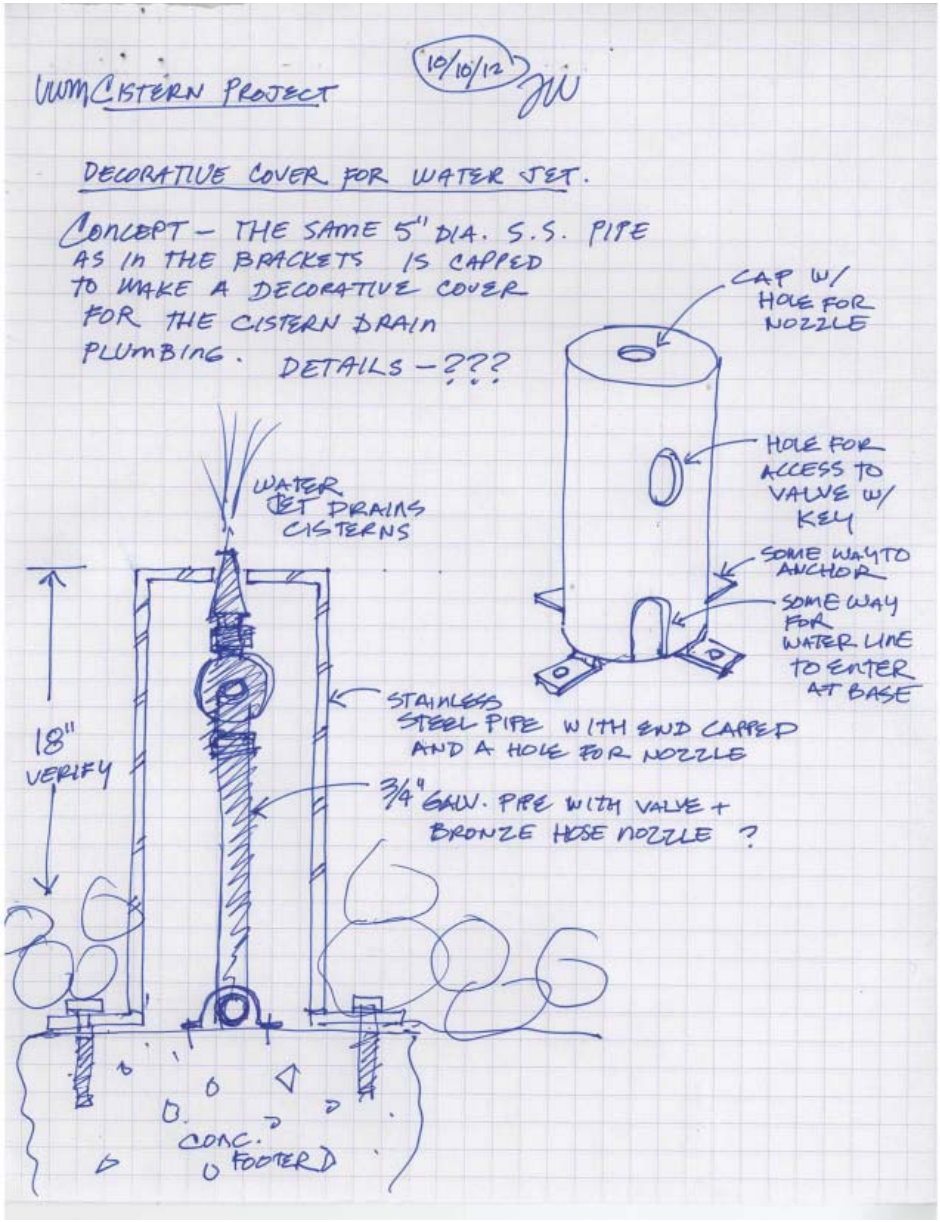

MILWAUKEE




United Rentals
1-800-UR-RENTS
450AJ
1-800-UR-RENTS
19 20




REUSED OUTLET TO AVOID DISRUPTING WEST STONE WALL
10/6/12 JW
VERIFY ALL LOCATIONS W/ OWNER
CAP PIPE. CAP WILL BE CONVERTED TO NOZZLE BY OWNER
RUN PIPE UNDERGROUND DOWN STREAM OF STONE WALL AND MAKE A VERTICAL FOUNTAIN NOZZLE
SCULPTURAL SHROUD BY OWNER
3/4" GALV. PIPE
18" VERIFY IN FIELD
24" ±
SLOPE TO DRAIN
PROPOSED HIGH WATER LEVEL BY OWNER'S ALTERATIONS
12" DIA CONC. FOOTER TO ANCHOR PIPE + SCULPTURAL SHROUD
OF GARDEN TO INCREASE LOST STORAGE CAPACITY
4 LF, ¾" Galv. Pipe Tap w/Spigot Outlet to Spiral Garden
POSITION HEAD IN CENTER OF BOWL
SLOPE PIPE TO DRAIN BACK TO SYSTEM
TUNNEL
CAUTION
Cistern 2
x 24' Height
11 ¼ ° Bend


WM CISTERN PROJECT
10/10/12 JW
DECORATIVE COVER FOR WATER JET.
CONCEPT - THE SAME 5" DIA. S.S. PIPE AS IN THE BRACKETS IS CAPPED TO MAKE A DECORATIVE COVER FOR THE CISTERN DRAIN PLUMBING. DETAILS - ???
CAP W/ HOLE FOR NOZZLE
HOLE FOR ACCESS TO VALVE W/ KEY
SOME WAY TO ANCHOR
SOME WAY FOR WATER LINE TO ENTER AT BASE
WATER JET DRAINS CISTERNS
18" VERIFY
STAINLESS STEEL PIPE WITH END CAPPED AND A HOLE FOR NOZZLE
3/4" GALV. PIPE WITH VALVE + BRONZE HOSE NOZZLE ?
CONC. FOOTER